# Coal Age

MARCH, 1957
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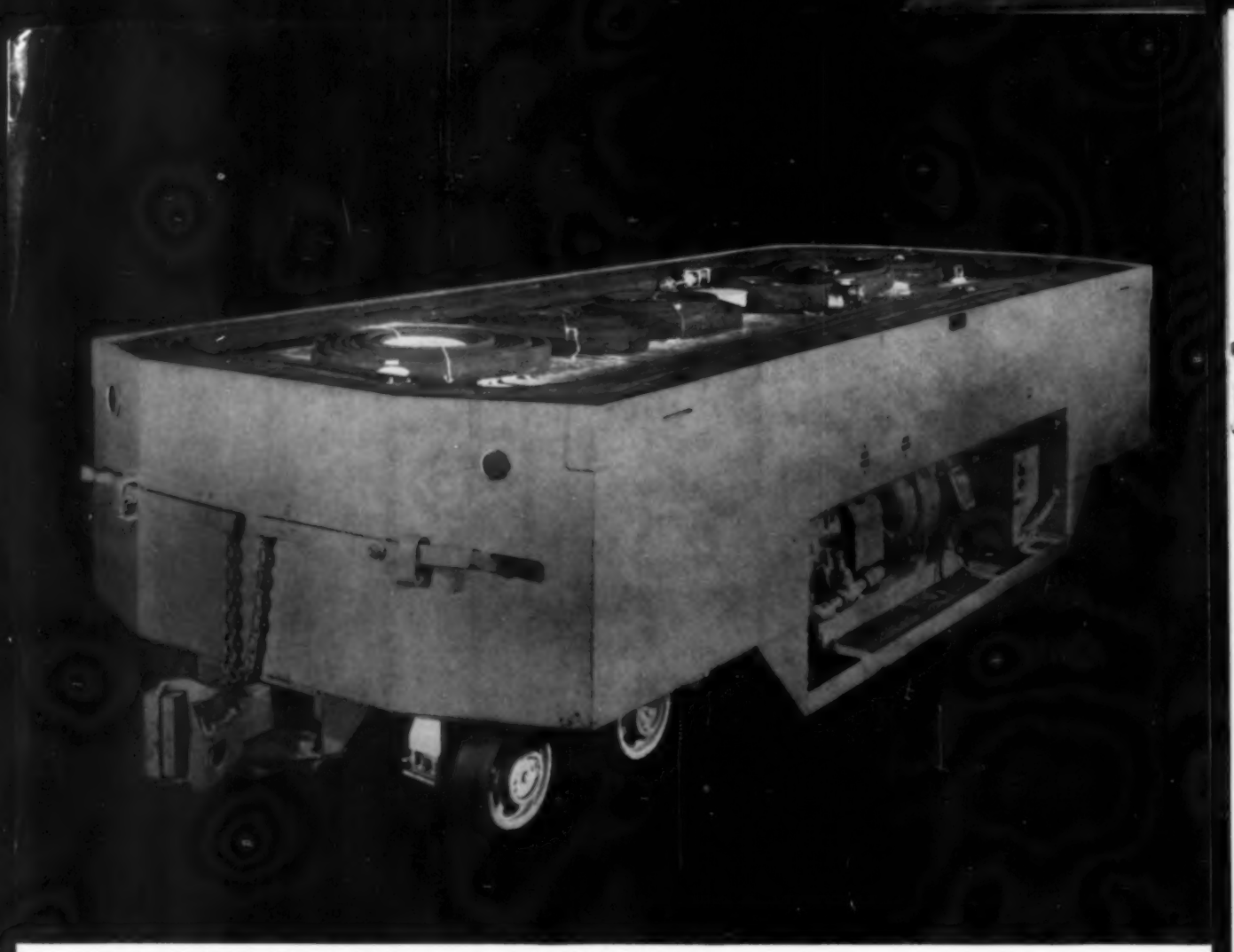

This fire truck delivers 100 gallons of water a minute, with a 450-foot head.

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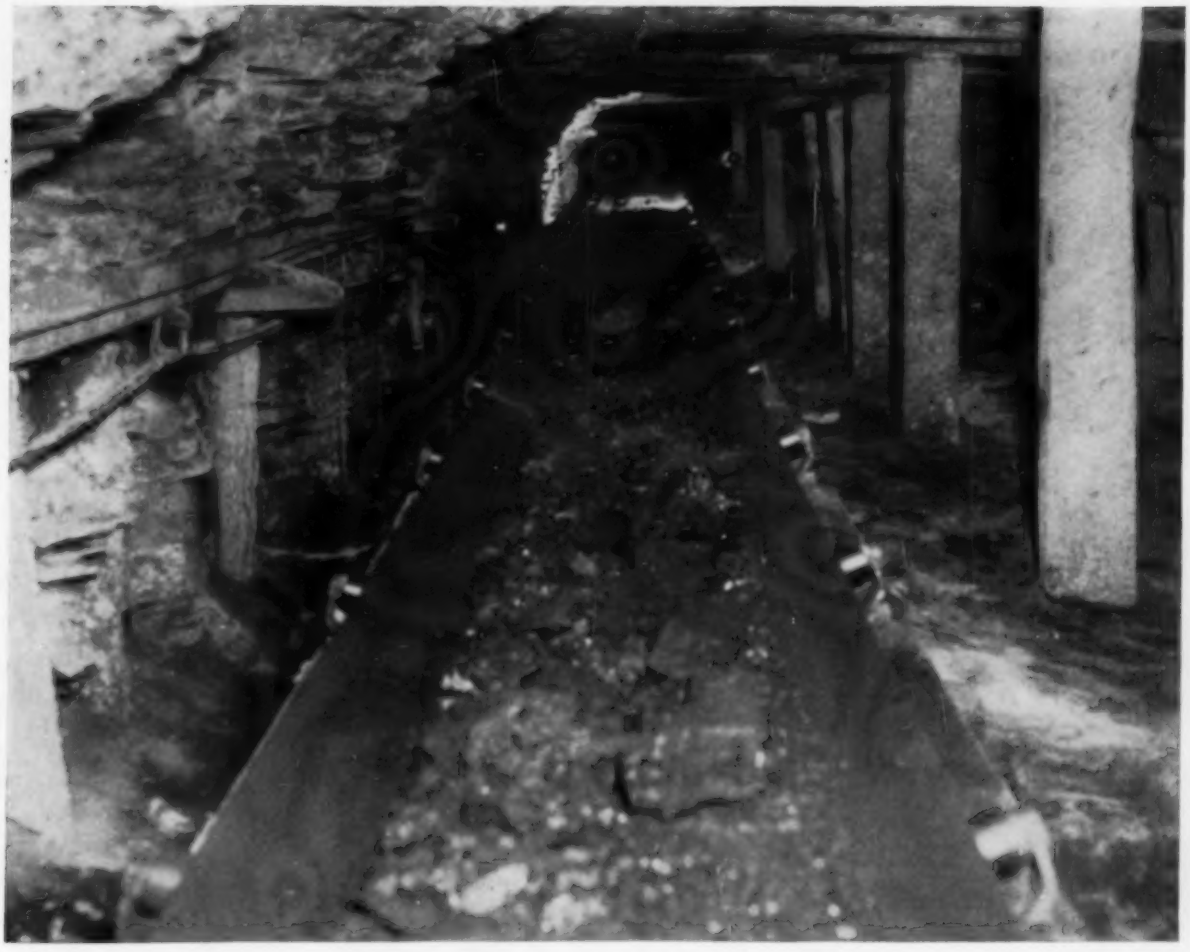
# B.F.Goodrich



# Where B.F.Goodrich belt reduced maintenance costs, lasted longer too

THAT picture shows the natural trough of a B.F.Goodrich cord belt—under a light load—as it carries coal from the mine to the cars. In use 6 years when this picture was taken, the B.F.Goodrich belt had outlasted all other conveyor belts in the mine and was expected to last another 4-6 years. There's been no maintenance due to edge wear. Here's why.

A conveyor belt that doesn't trough naturally—under light as well as heavy loads—loses complete contact with idlers, runs off center, wears along the edges.

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Before you buy another conveyor belt, look into the cost-saving advantages you get with a cord belt, and the safety you can get with B.F.Goodrich fire-resisting rubber. Your B.F. Goodrich distributor can give you full details, or write *B.F.Goodrich Industrial Products Co., Dept. M-890, Akron 18, O.*

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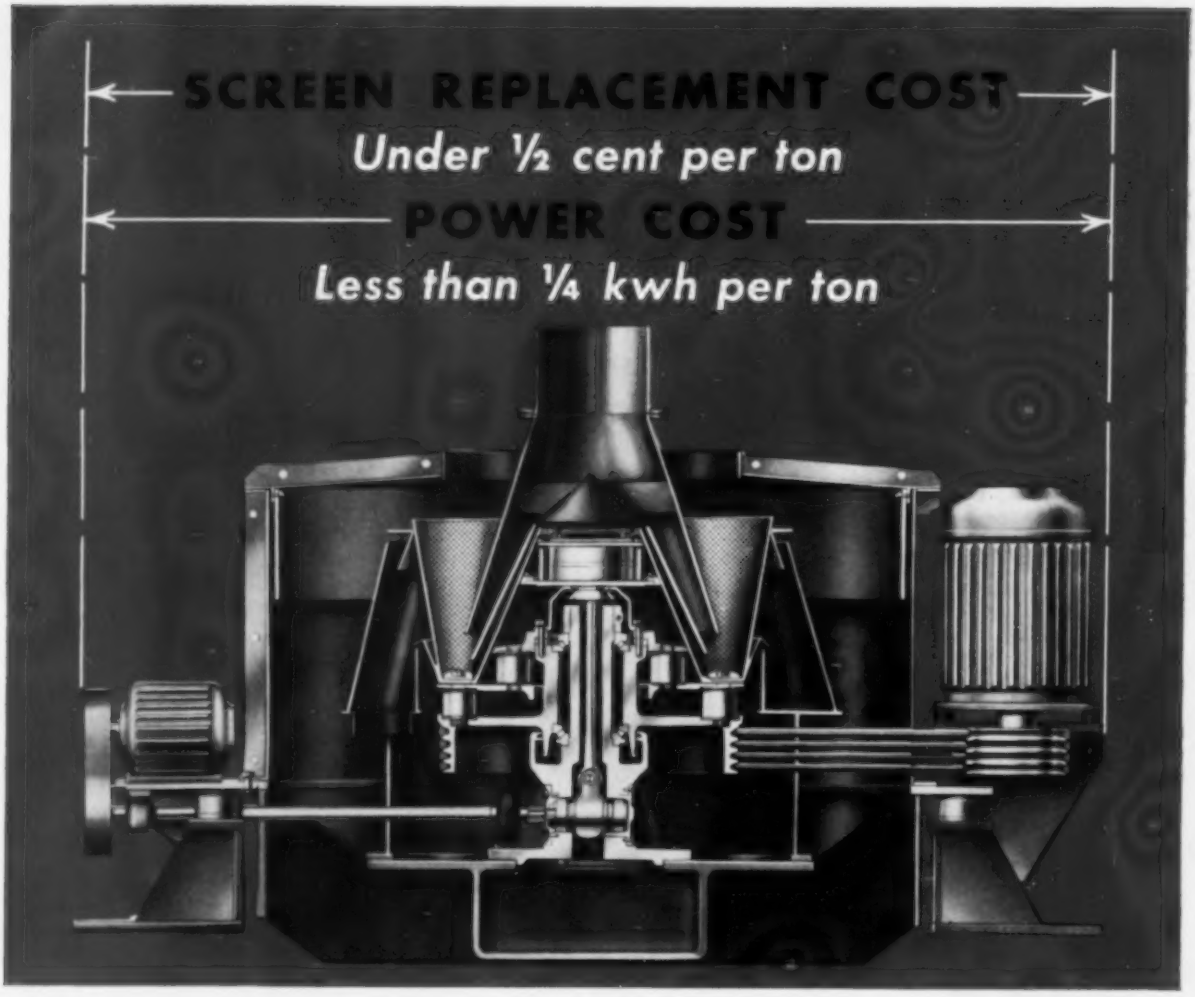


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# This Month in Coal Age

**MARCH 1957**

## ► Engineering Manpower

### Coal's Engineer Shortage . . . . . p 54

**M. D. Cooper,** Director, Mining Engineering, Education, National Coal Association.

The bituminous industry now would hire more than 250 engineers if they were available to supplement the efforts of the 1,700 to 1,800 presently employed. Anthracite now has around 200 engineers and has no outstanding need for more. Industry growth will aggravate the effects of the bituminous shortage unless the industry intensifies its recruiting work, expands its scholarship program and makes employment more attractive.

## ► Continuous Mining

### Pittsburgh-Seam Pillaring With Continuous Miners . . . . . p 58

**Martin Valeri** Assistant Superintendent, Buckeye Coal Co., Nemacolin, Pa.

Continuous-mining crews average 55% more tons per man-shift than conventional-mining crews under comparable conditions and using the same mining layout, experience at Nemacolin shows. Loop haulage, sufficient power at the face, good ventilation and maximum extraction contribute to higher overall efficiency. In many instances, drawslate can be held up, increasing the efficiency of preparation of the coal for by-product coking.

**Added Features**—Panel layout, block-extraction and stump-extraction diagrams employed in continuous mining at Nemacolin.

## ► Anthracite Preparation

### Gravity Flow in Cleaning Coal . . . . . p 61

How plant design contributes to lower costs in mintenance, power and labor is shown by the Blaschak Coal Co. property at Mahanoy City, Pa. Separate rough-cleaning facilities eliminate excessive vibration from the main plant; heavy-media system shows a magnetite loss of 0.32 lb per ton of clean coal; wet tables produce maximum yield of fine sizes; and gravity flow reduces degradation.

**Sidelights**—Stainless-steel chute liners and screens, and aluminum pipe, reduce overall costs; blast-furnace slag surfaces traffic areas at coal pockets.

## ► Preventing Roof-Fall Injuries

### A Banner Year at Wheelwright . . . . p 64

Miners and supervisors of Inland Steel Co., including 420 men classified as face workers, produced 1,427,193 tons in 1956 without a lost-time injury or fatality chargeable to roof falls. General committee of labor and management representatives backs up program. Integrated incentives and scheduled meetings keep interest alive.

**Wheelwright Highlight**—Forms used by Inland Steel in rating safety performance of supervisors and production crews, and in posting results of safety inspections.

## ► Acid Elimination

### Mine Acid Control—A New Approach p 68

**S. A. Braley,** Administrative Fellow, Mellon Institute of Industrial Research.

Acid discharge from mines is the most-serious of all water-pollution problems. Neutralization is impracticable, leaving the engineering approach as the most promising, with its goal the reduction of exposure to acid-forming materials. New mine of the Christopher Coal Co. will permit testing of the worth of frequent water discharge to cut down contact with sulphuritic materials.

**Along the Way**—One mine that has been producing acid since 1761; basic provisions of the Pennsylvania regulations.

*(Continued on p 7)*

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You can draw on your nearby Ryerson plant for an almost endless number of products and services—and the more you concentrate your purchases at one source, the more you save. Ryerson products not pictured here include: Re-bars, expanded metal, grating, plastic pipe, machinery and tools, etc. See your Ryerson catalog for complete list and write for descriptive literature.

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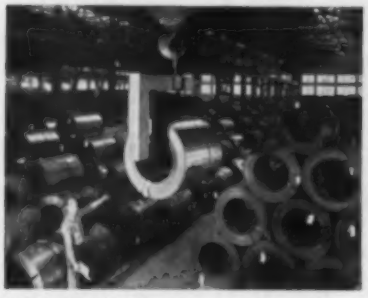
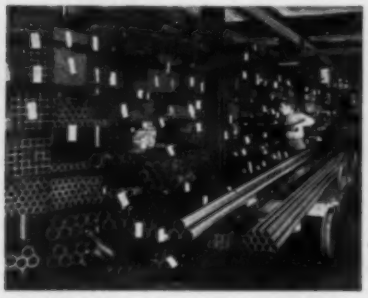


**SHEETS & STRIP**—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



**TUBING**—Seamless and welded mechanical tubing, fluid power tubing, structural and boiler tubes, etc.

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## ► Standards for Mining

### Production and Cost Control Through Industrial Engineering . . p 70

**Daniel C. Shewmon,** Industrial Engineer, Pocahontas Fuel Co., Vivian, W. Va.

Standards evolved through application of industrial engineering principles provide quick-accurate control over output and costs; permit prompt elimination of waste and losses; provide data for changing practices to increase efficiency; and set the stage for realistic incentives. Time studying the operation is the first step. Development of a standard work plan is the next, after which control is provided by proper daily production and delay reports.

**By-Products**—The eleven "musts" in setting good standards; using a "mode chart;" fatigue and machine-pace allowances; use of standards in forecasting and budgeting.

## ► Strip Reclamation

### How Kentucky Reclaims Stripped Lands . . . . . p 77

**John M. Crowl,** executive director, Kentucky Reclamation Association, Earlington, Ky.

The Kentucky Reclamation Association was organized by a group of mining companies in 1948 to facilitate efficient land reclamation by planting and otherwise. Now, each property is studied to determine best use, including planting, wild-life propagation, recreation, grazing and so on. Plantings since 1948 include 4,290,950 trees. Acreage reclaimed totals 6,985.

**Sidelights**—The first western Kentucky coal mine (a stripping operation); the rise of the chukar; and the survival rate in tree planting.

## ► Track Haulage

### You Can Change Track Gage . . . . . p 80

Changing the gage of over 4 mi of track from 44 in

*(Continued on p 11)*

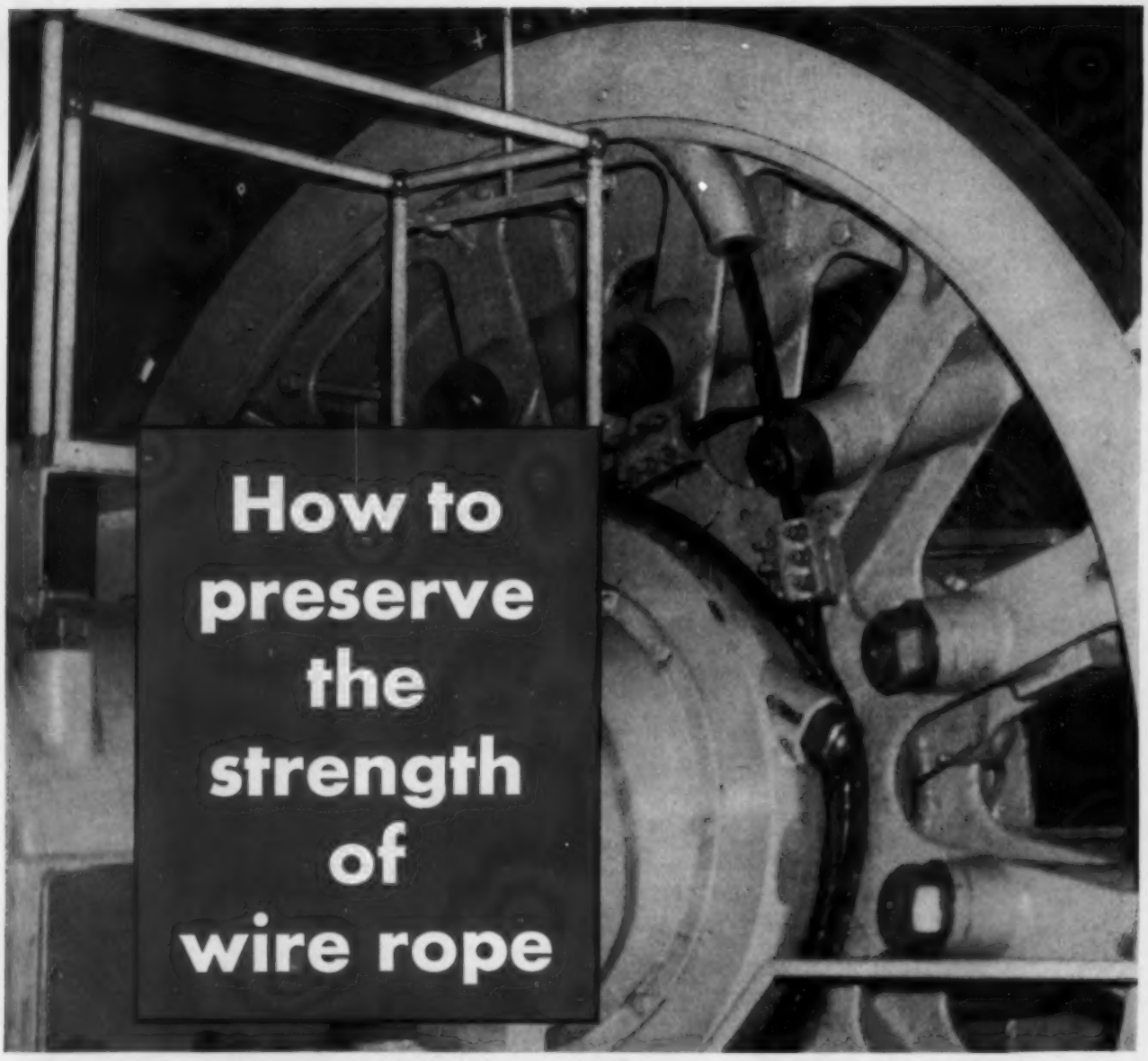
# This Month in Coal

SLOW START—Compared to January, 1956, January, 1957, found coal considerably behind in tonnage—about 4 million in bituminous and 750,000 in anthracite. Reasons? In bituminous, the traditional seasonal drawdown in stockpiles, plus losses due to cold weather and floods. Warm weather in the latter part of 1957 affected anthracite results. Meanwhile, steel, electric power and general industry, automobiles excepted, kept on at the high levels of activity of recent years—all straws indicating a fair production wind for coal. The longer it lags in blowing, however, the higher the weekly production rate that will be necessary to meet expected demands, and the greater the strain on the railroad car supply.

SALES POWER—Coal is formally dedicated to the principle that more tonnage under single controls is the road to the concentration of power that means maximum impact in marketing. One way of attaining this concentration is actual mergers, which get the lion's share of the limelight. The second is less publicized but is almost if not equally effective. It is putting more tonnage into individual sales agencies. February brought further examples, and as 1957 goes along look for an acceleration of the trend toward both types of concentration. By year end the top 15 bituminous producing groups could be accounting for more than 40% of the output, with a corresponding increase in the tonnage represented by the top sales groups.

NEW PORT? As overseas exports burgeoned, ships became one of the first bottlenecks, broken only when American Coal Shipping was organized. How far ship hoarding has been relaxed may be judged by the fact that since Jan. 1 50 additional coal-carrying ships have been released. Now, the problem of port facilities here, as well as abroad, is becoming more serious. This has stimulated, among other developments, an active drive to make Charleston, S. C., a major coal outlet. Needed is money for facilities, now inadequate or nonexistent. But if hard work means anything, it will be found, and Charleston brought into the list of ports now struggling with a growing overseas tonnage, which could reach 60 million in 1957.

NEW OIL DELUGE—On the surface, it has looked as if the Suez closure and the warning of the hazards involved in relying on foreign sources should have relaxed the oil import pressure. Not so in fact. Imports, primarily to the East Coast and, as usual, primarily from Venezuela, have increased in spite of the hullaballoo over raising shipments to Europe to replace Near East cargos. The difference between talk and performance has, in fact, become so great as to bring in the federal government with both a plea and a threat to use its control powers. When the Near East flow will resume is problematical. It might be a long time if Nasser wants to keep the gate closed. When flow does resume, is the backwash going to deluge the United States? Some government people and the independent producers are worried. Maybe it won't happen, but the odds are not as long as they were.



# How to preserve the strength of wire rope

You can keep wire rope strong longer by using a lubricant that protects every strand—and surrounds and preserves the core.

Use *Texaco Crater*. It does both of these jobs effectively. It penetrates the rope—encloses and seals the core. Its protective film prevents both rust and corrosion—minimizes wear, by reducing both internal and external friction. In addition, it is sufficiently adhesive to cling to the strands and provide long-lasting protection.

You can use *Texaco Crater* on hoist lines, power shovels, draglines and slusher ropes. You'll find it's economical protection—especially so when you compare the low cost of lubrication to the high cost of downtime and replacement.

*Texaco Crater* is ideal, too, for open gears.

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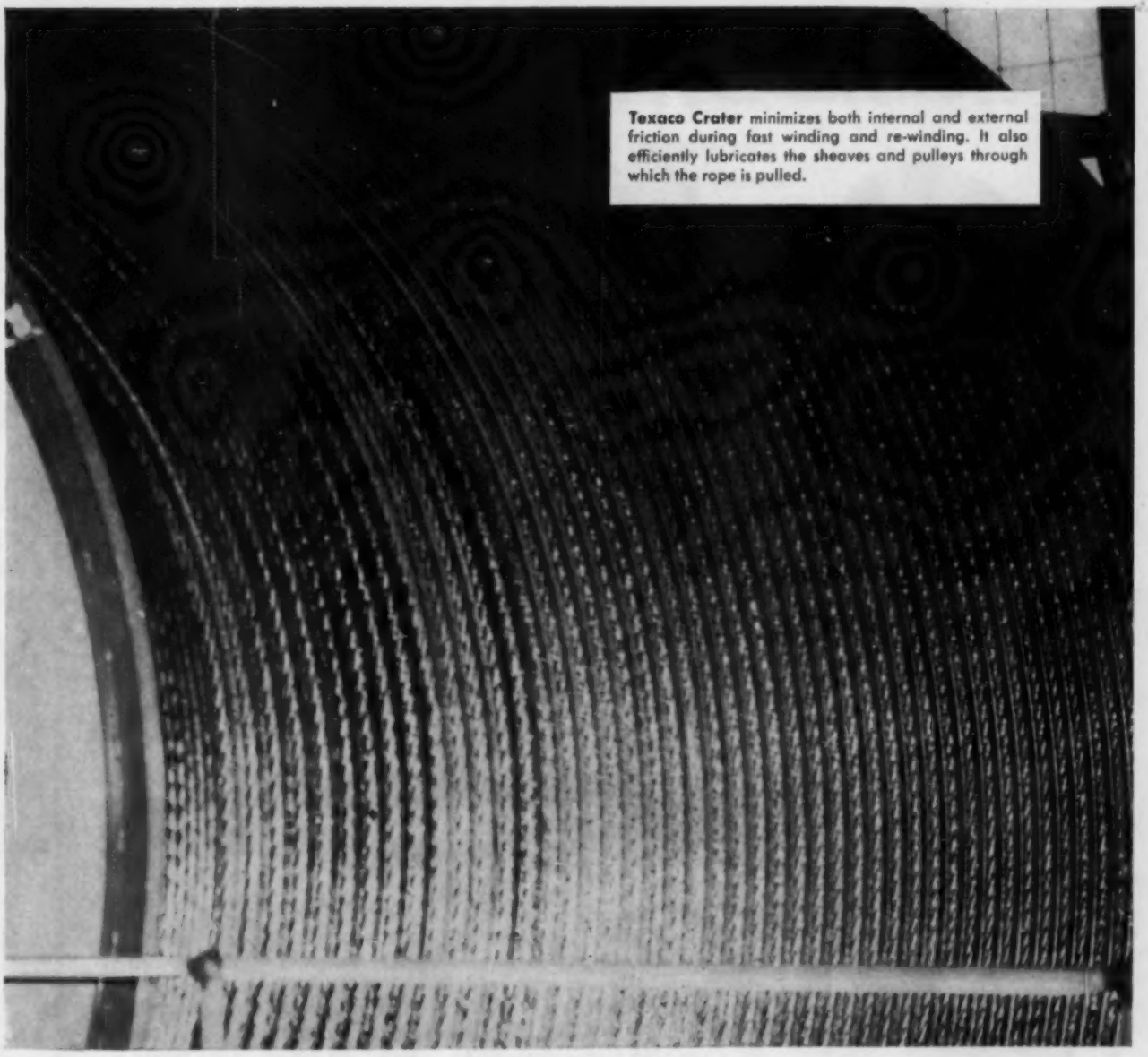

**Texaco Crater** minimizes both internal and external friction during fast winding and re-winding. It also efficiently lubricates the sheaves and pulleys through which the rope is pulled.

It stays on the teeth—protects gears against wear by cushioning shocks and heavy loads.

*Texaco Crater X Fluid* offers you the application ease of a spray-on lubricant for both gears and wire rope. It has all the protective properties of regular *Crater*.

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# This Month in Coal Age

**CONTINUED**

to 48 in over a single weekend is a feat performed by officials and workmen at a recently-acquired mine of the Blue Diamond Coal Co. The result is that heavier locomotives can haul longer trips, and equipment is standardized with that of other mines of the company.

**Noteworthy Item:** How to handle narrow- and wide-gage equipment while the change is made; how to organize crews.

## ► Strip Mining

### Planned Flexibility Matches Changing Stripping Conditions . . . . . p 81

Varying conditions in hilltop stripping at Zacherl properties in Clarion County, Pennsylvania, are met with small diesel-powered equipment, which can be moved easily. Big bulldozers play a major role in helping move up to 60 ft of cover to expose 48 in of coal. Truck-mounted dry-type rotary drill alternates between two pits. After shooting, bulldozers push upper portion of bank into and across pit, leaving the remaining spoil within easy reach of the stripping units.

**Added Starter**—New dense-media washer for a cleaner, more-uniform output.

## The Coal Commentator . . . . p 12

The heat pump for cooling as well as heating; water infusion possibilities in continuous mining; higher efficiency in rail sanding for locomotives; possible peaks and averages in monthly strip yardages; the trends in preparation thinking.

## Editorials . . . . . p 52

Coal's engineer shortage and what to do about it; the safety stalemate; possible freight-rate developments.

## The Foremen's Forum . . . . . p 86

Quiz on mining problems and questions; keeping your mind on the job.

## Operating Ideas . . . . . p 90

Portable water tank made from scrap; tips on brake maintenance for earthmoving equipment; car spotter uses cutter bar and cutter chain; safety device prevents prop dislodgment in shooting.

## Equipment News . . . . . p 94

"Different" products include rock-drilling crawler, heavy-duty crusher, oscillating conveyor, conveyor-belt cleats, jumbo screen wire, plus other products for both deep and strip mining.

## News Roundup . . . . . p 122

Oil and export developments, the Bishop explosion, the legislative picture on mergers, transportation developments and freight rates, plus preparation contracts, coming meetings, equipment approvals, books for coal men and other regular news and service features.

**Added Starter:** The coal pipeline.


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# The Coal Commentator

## More Power

**"The electric heat pump makes it possible to 'Live better—electrically.' "** So notes the Alabama Power Co., whose load-building activities, including promoting the heat pump, have recently resulted in the opening of a big new coal mine. Further on the heat pump, Alabama Power says: "It adequately and automatically provides full air conditioning every day in the year regardless of how changing the weather may be. It is giving satisfactory service in homes, stores, offices, clinics, churches and industrial applications."

Alabama Power is specific in its sales promotion and thus provides data on electricity for summer cooling. Two homes equipped with 3-ton heat pumps, 12,900 and 15,000 cu ft, respectively, used 4,310 and 4,761 kwhr for cooling. Larger homes, 5-ton units, 16,200 and 28,900 cu ft, used 8,930 and 10,730 kwhr. If the coal rate is figured at today's low of 0.85 lb per kwhr, these four homes used 12.2 tons for summer comfort and for winter, 14.1 tons—this where winters are fairly mild.

**The rise in public-utility demand provides coal with one of its biggest opportunities, including getting back into homes for heating via wires. As cooling is added, demand goes up accordingly. So, more power to Alabama Power—and to other load-building utilities.**

## Added Benefit?

Because of radical differences in mining conditions in the United States and abroad, the opportunities for exchanging ideas and equipment are limited. But there have been exceptions and others may be expected in the future. **One possibility is water infusion to prevent the formation of dust in mining and loading.**

**Infusing solid coal with water has been found to loosen the coal and promote mining without shooting in a number of instances. Is there something here for the continuous miner user in the United States?** It might be that the extra output resulting from the easier mining following pressure infusion would alone be worth the extra cost of the operation. Water is or will be practically universal at the face. If it can be used to help the production operation in addition to eliminating dust, so much the better. Perhaps the idea is worth a little time and money for experimentation.

## No Blowback

**As long as coal uses locomotives—which is indefinitely—it will be wrestling with the problem of preserving the grip of the wheels on the rails.** Back in October, 1955, your commentator reported on experiments designed to uncover the cause of slip. It turned out that it was oil floating on the moisture. Now, he can report on a new method of applying sand to keep down the quantity and eliminate the adverse effects of excessive sanding.

The new method of sand application has been worked out by the Southern Pacific Ry. on the basis of Stanford Research Institute findings that pinpoint application to the nip between wheel and rail is vital. Such precise application cuts quantity to one-sixth the old rate. "Blowback" caused by wind was the big difficulty. The answer? an outer cylindrical air sheath provided by a circular nozzle around the sand nozzle. **Less slippage and less sand, at one and the same time, is a major achievement, whether in hauling on railroad or mine tracks.**

## Up Again

**"The Mountaineer," presently the largest stripping shovel in the world—in fact the largest shovel of any kind—has been measuring up to expectations.** It started moving overburden for Hanna Jan. 30, 1956. In spite of being handicapped somewhat by the necessity of starting new pits, it moved 17,062,094 cu yd in 11 mo in 1956 in bank averaging 73.65 ft. The monthly average was 1,551,099 cu yd. The alltime peak was in October, with 2,074,376 cu yd in 74.94-ft bank. Operating time was 83.54% of total available, compared to 75.78 to 84.62% for four smaller 46-yd machines. These four machines averaged 1,138,090 cu yd per month each.

Even bigger shovels are now being built, solidifying coal's position as the biggest of all self-powered land machines. **The performance of "The Mountaineer" is evidence that these shovels, too, will set new records—exactly how high only time will tell. But averages of over 2,000,000 yd per mo are not beyond expectation.**

## Results Plus Show

**The preparation contract list for 1956, which appeared in the February *Coal Age* (pp 66-69), is evidence that mine size is growing with the size of the producing groups, particularly in the bituminous industry.** The 1956 list shows four plants with rated capacities in excess of 1,000 tph, with one reaching a peak of 1,320 tph through the plant and another 1,500 tph into the stockpile and 1,200 tph through the plant. All these plants are designed to serve single mining operations, meaning that these mines will produce 3,000,000 tons or more a year.

These plants, as well as others, reflect the growing concern of producers with satisfying the heavy fuel markets, as well as with meeting pollution requirements and maintaining good relations with the public in the plant neighborhoods. Raw- and prepared-coal storage and blending facilities are common, along with fine-coal treating and water-handling equipment, heat and mechanical drying, and so on. Conclusion? **Coal is clearly showing that it intends to give its customers a quality advantage equal to its cost advantage—and provide some real show plants at the same time.**

# how Bearings, Inc. goes to work for its customers!

Here's service with a capital "S" as we see and practice it with the cooperation of our customers throughout *all* industry. Steel mills, foundries, mines, manufacturing plants—wherever bearings are used.

In the photograph are: left, B. H. Weideman, Millwright Foreman; J. A. Rupp, Maintenance Superintendent of the Ohio Boxboard Company plant at Rittman, Ohio, and the Bearings, Inc. salesman, Jack Houser.

They are going over the final phases of a "bearing survey" Jack has been making for the company over the past six months. In this "survey" every bearing in every machine and pump in the Mill Division was located. The make, type, size and fit of over 4,000 anti-friction bearings was determined.

The result of the "survey" has been very gratifying to plant executives. Information on every bearing is now at hand, instantly. Inventories of bearings are being steadily reduced and when the records show, to cite only one example, that 6 large, expensive bearings on 3 mills were identical except for a slight and unnecessary variation in internal fit, then no longer do they stock 4 replacements, 2 are plenty!

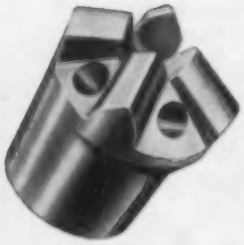
Do you need this kind of Bearings, Inc. service in your plant? We'll soon tell you . . . all you have to do is ask, no obligation of course.

***Rendering bearing service in the territories adjacent to our branches, listed below.***

## BEARINGS, INC.

**OHIO:** Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Mansfield • Toledo • Youngstown • Zanesville
**INDIANA:** Ft. Wayne • Indianapolis • Muncie • Terre Haute
**PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
**WEST VIRGINIA:** Charleston • Huntington • Wheeling
**NEW JERSEY:** Camden • **MARYLAND:** Baltimore
**DELAWARE:** Wilmington •
*Subsidiaries:* Balanrol Corp. • Buffalo, N.Y.•
Kentucky Ball and Roller Bearing Co. • Louisville, Ky.

# Four Ways to Save Money with CRD One-Use Bits



**1. You drill faster** with low-cost Le Roi-Cleveland CRD one-use bits because they have a special offset gauge feature which permits the use of thinner wings, and a steeper reaming angle. Binding is greatly reduced, and ample clearance is provided for cuttings.

**2. You have less drill-steel breakage** with Le Roi-Cleveland CRD one-use bits. The method of bit attachment eliminates threads on the drill rod. And since a drill rod is only as strong as the root diameter of its threads, the tapered, *threadless* CRD's give you a stronger, power-saving union, and longer drill-steel life. Other savings result from reduced handling and reconditioning costs.

**3. You have less wear and tear, too.** Rifle bars, rifle nuts, and chucks will last longer because CRD's are designed to reduce binding and ease strain on rotation parts of your drills.

**4. They cost less, initially.** CRD's cost less than 25¢, half as much as comparable multiple-use bits. There's a big saving in time and labor spent handling bits, too. CRD's knock-off, throwaway use eliminates unscrewing, and all the time-consuming traffic between operator and bit shop.

**It costs practically nothing to try them.** You don't need to invest in special threading or reconditioning equipment when you use Le Roi-Cleveland CRD one-use bits. Satisfy yourself that they can save you money. Get a can today, and start cutting your drilling costs right away.

**LE ROI** Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

AT-71

# "Sunday-Punch"

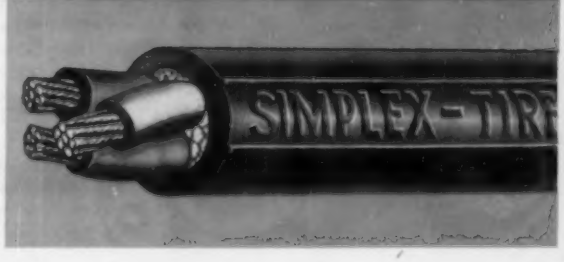
The pin-point blasting that rips away the side of a hill for strip mining is just one of the many mining operations in which Simplex products play an important part. Simplex-TIREX trailing cords and cables, engineered especially for mining work, are on the job in and around mines everywhere. TIREX cables are newly improved for greater flexibility. Their cured-in-lead Neoprene Armor resists abrasion, oil, heat and water, and gives longest life.

**SIMPLEX WIRE & CABLE CO.,**
79 Sidney Street, Cambridge 39, Massachusetts.

LIVE BETTER ELECTRICALLY

Simplex

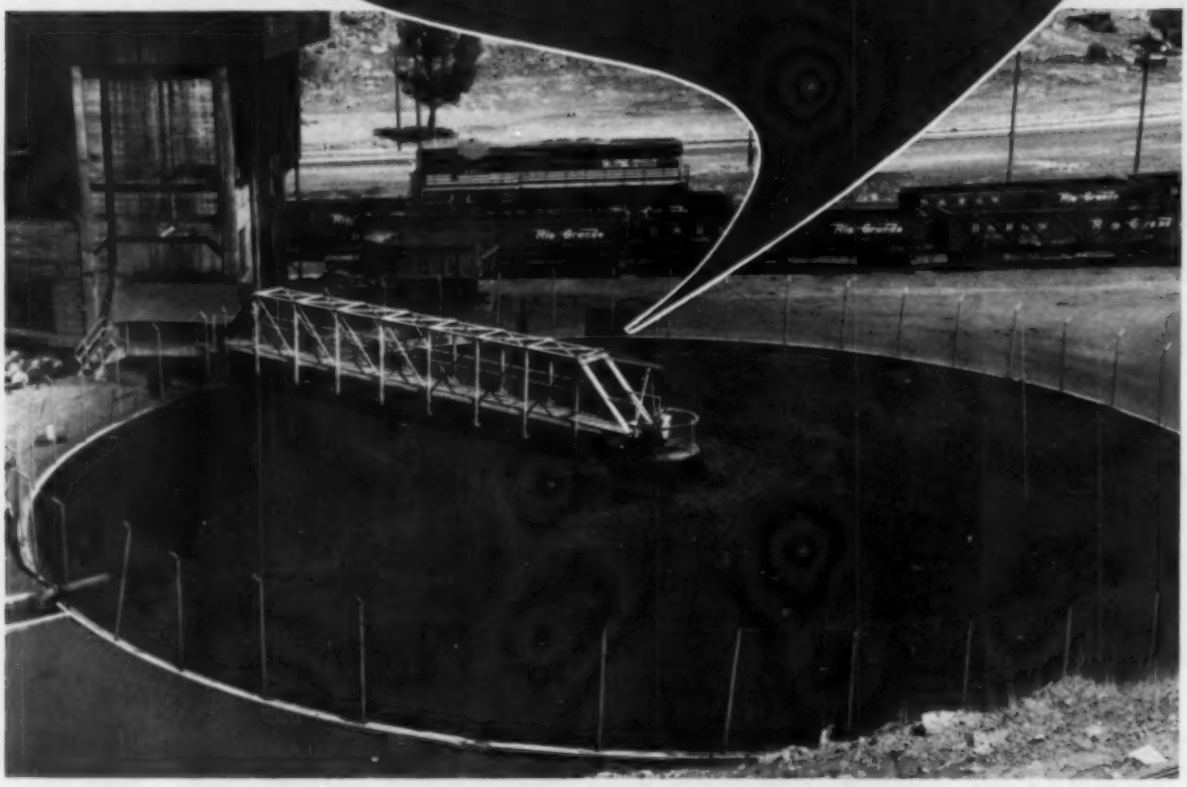
**TIREX**



# How KAISER STEEL Recovers 28 Mesh Coal

## Clarifies Process Water for Reuse...

Closeup view of the 120 ft. dia. Type S Dorr Thickener at Kaiser Steel Co., Sunnyside, Utah.



The fine coal recovery system of Kaiser Steel Company's Coal Preparation Plant at Sunnyside, Utah, consists in part of a large settling tank which makes a 28 mesh separation from a feed of minus 3/16" washed coal and water. Approximately 30% of the settling tank overflow — 2500 GPM of water containing 52 TPH of minus 28 mesh solids — is then laundered to the 120 ft. dia. Dorr Thickener. From the Thickener underflow, Kaiser Steel has been obtaining a concentration approaching 40% solids by weight. The overflow from the Thickener is of sufficient clarity that fines entrained in the circulating process water may be closely controlled.

*If you have a problem in the recovery of fine coal, Dorr-Oliver engineers can be of help to you. Write Dorr-Oliver Incorporated, Stamford, Connecticut, U. S. A.*

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INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
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21404

Patented and Patents Pending

## Here's your pace setter in low coal

# GOODMAN TYPE 965 LOADER

Even if you have the most efficient cutting operation, and the fastest shuttle car handling, you still could be losing out . . . if your loading operation isn't up to par. Don't let lazy loading trim your profits. This is the spot for a Goodman loader to set the pace.

In low coal the choice is Type 965. Only 26½" high, this loader with a cleanup width of 7'1" has the capacity and speed to gather up coal at the rate of 10 tpm. Motors are continuous rated; two 20 hp. units for loading, two 15 hp. units for tramming and hydraulic pumps. Response to controls is immediate and smooth, maneuvering in close quarters is easy. Design throughout is simple with a minimum of moving parts. Maintenance cost is low.

For higher coal you'll want Type 966, the newest addition to the Goodman line. This loader matches the 965 except for an overall height of 31½".

For cutting machines, loaders and shuttle cars best suited to your conditions call in a Goodman sales engineer.

20634—Type 2400 Cutter—moves anywhere in the mine, cuts anywhere in the seam.

21179—Type 870 Shuttle Car—rugged dependability for fast transfer of loads.

**GOODMAN**

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

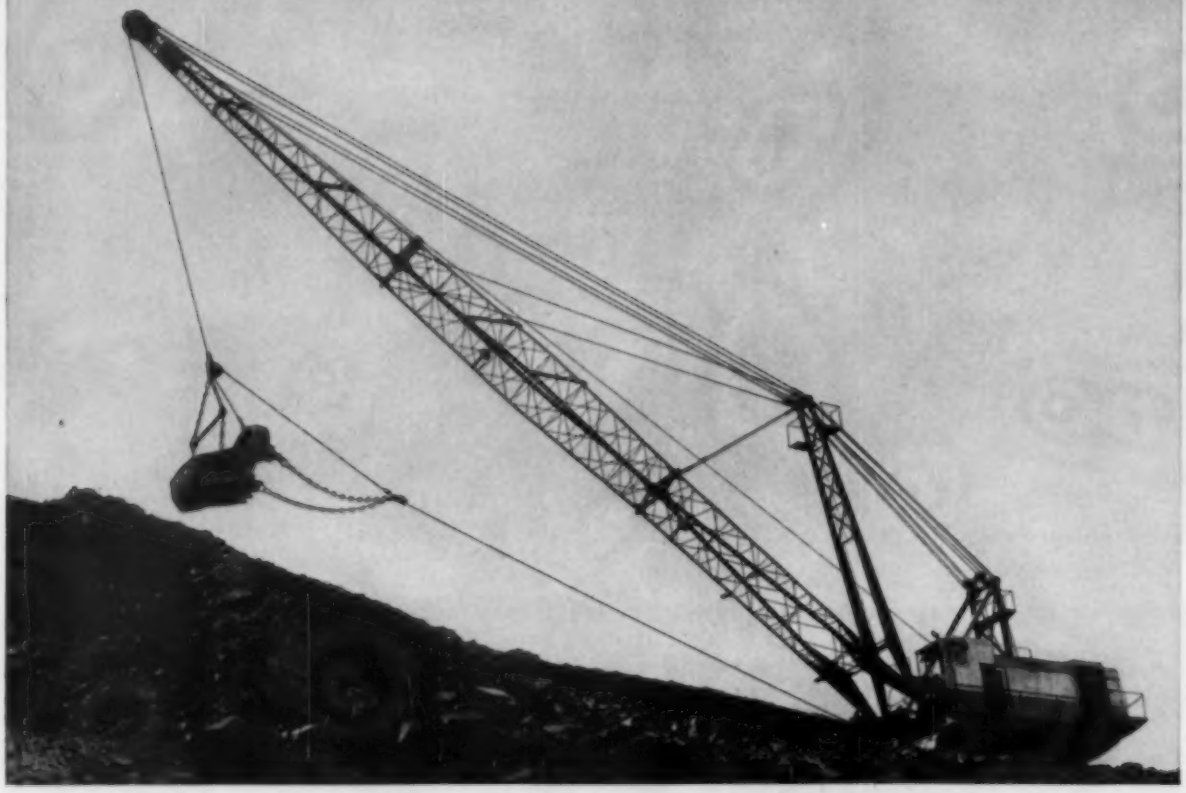
CUTTING MACHINES • CONVEYORS • LOADERS

SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

*Use Genuine Goodman Replacement Parts*

an ACCO product

American Cable TRU-LAY VHS | 15% STRONGER



# 57% Longer Life with New VHS Dragline

Draglines take a real beating in the coal stripping operations of the C B & M Coal Company, Plains, Pennsylvania. Used for removing over-burden, the best Improved Plow Steel draglines lasted 525 hours. When new TRU-LAY VHS draglines were used they established service records of 825 hours—57% better than Improved Plow Steel.

**Entirely New Grade**

VHS is setting similar service records on Draglines all over the country. Made from a new grade of steel for wire rope, new VHS is at least 15% stronger than Improved Plow Steel, the strongest grade available before VHS. This means you can handle heavier loads with the same diameter line. And you get a higher factor of safety.

**For Slusher Ropes, Shovel Hoist Ropes, Winch Lines**

New VHS is also tougher . . . resists abrasion . . . cannot become "hide-bound" or lose its flexibility. Developed especially for use as slusher ropes, draglines, shovel hoist ropes, and winch lines, it stands up better in these toughest services.

**Cuts "Down Time"—Saves Money**

In addition to longer life, new VHS cuts costly "down time" of equipment for wire rope replacement. This can mean savings.

**At Your Distributor Now**

Your American Cable distributor has draglines, slusher ropes, shovel hoist ropes, and winch lines of new VHS in stock now. Just call him and tell him the size and length you want. You don't need any complicated specifications.

*See your American Cable Distributor or write to the nearest American Chain & Cable Company Office*

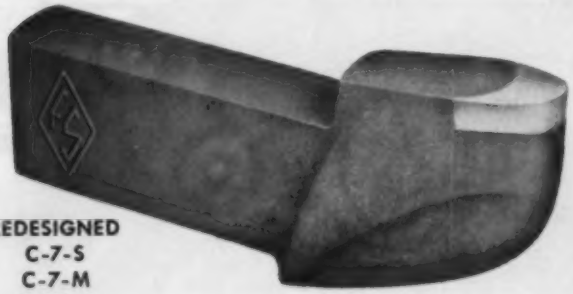
ACCO American Cable Division

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

# NOW...Longer Bit Life, Lower Costs, *with improved design* FIRTHITE Machine Bits

Design improvements in the famous "Blue Bits," addition of a new bit for bore type continuous miners, and the introduction of a low-cost THRIFT-BIT assure an even more complete selection of mining tools to give you maximum performance at minimum cost under all mining conditions.



**REDESIGNED**
**C-7-S**
**C-7-M**
**C-7S-4**

The C-7 Series has been redesigned for even greater effectiveness by "beefing up" the area immediately supporting the carbide to absorb severest shock and impact, and streamlining the heel clearance to reduce excess steel for lower regrinding cost.

**NEW**
**CMC**

Specifically designed for bore type continuous miners, the new CMC incorporates a heavy duty head, to resist extreme side pressures, and a large self gauging shoulder on three sides that assures positive seating and minimizes holder damage.

The "face lifting" of Firthite "Blue Bits" is a continuing project of Firthite mining tool engineers . . . that's why "Blue Bits" continued to break records in heavy duty production operations.

## *All NEW* a low cost, all purpose THRIFT-BIT

**NEW**
**C-9**

Try the new C-9 THRIFT-BIT! It is virtually a "throw-away" machine bit for general purpose cutting operations where high production at minimum cost is required. Without sacrifice of quality components Firthite engineers have produced this economy bit that performs outstandingly yet sells at the lowest price. It is the *only* economy bit made on a *premium alloy drop forge shank!*

Available from stock for immediate delivery from authorized distributors.

**Firth Sterling**

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

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AUSTIN POWDER COMPANY—Cleveland, Waynesburg, Evansville, Madisonville, W. Frankfort, Clarksburg
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SERVICE SUPPLY COMPANY—Wheeling
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MOLE-BITS COMPANY—Johnstown
U. S. STEEL SUPPLY DIVISION—Pittsburgh
CARL B. LEWIS—Scranton
GUYAN MACHINERY—Logan

R-525

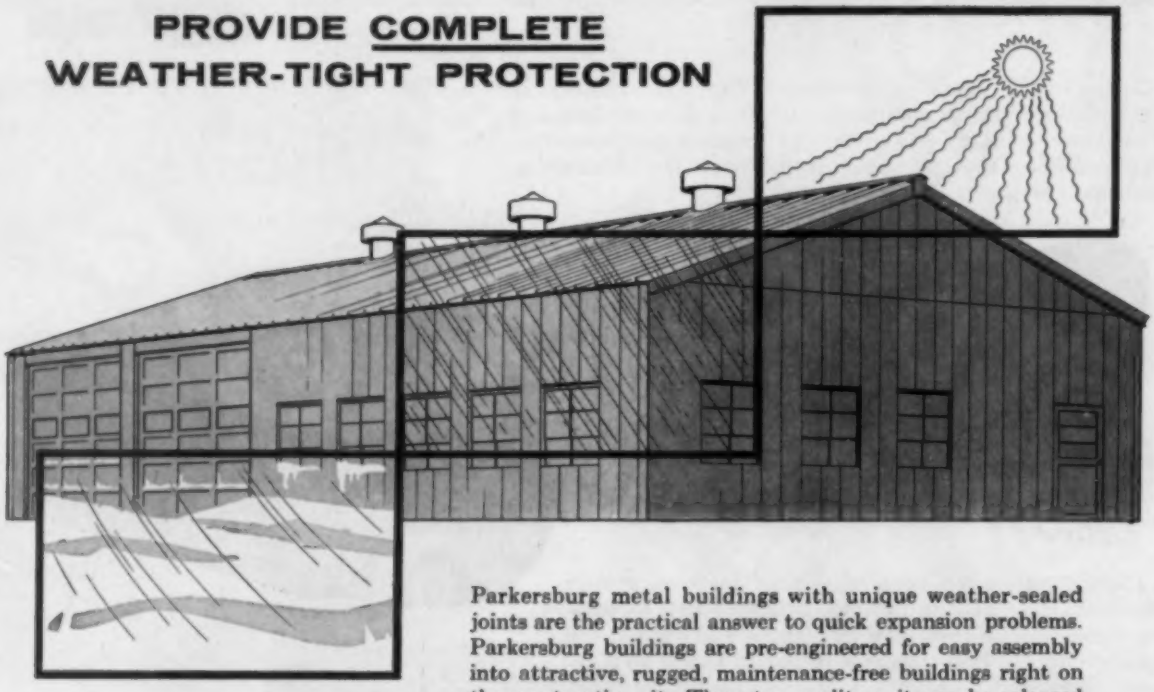
**PRODUCTS OF FIRTH STERLING METALLURGY**

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

quality

# PARKERSBURG metal buildings

## PROVIDE COMPLETE WEATHER-TIGHT PROTECTION



**The secret is in this unique "seven-fold" joint!**

This panel locking arrangement provides a true weather-tight seal in a rigid joint. All Parkersburg metal buildings employ this feature as proof against driving rain, dust, snow, and high winds.

Parkersburg metal buildings with unique weather-sealed joints are the practical answer to quick expansion problems. Parkersburg buildings are pre-engineered for easy assembly into attractive, rugged, maintenance-free buildings right on the construction site. These top-quality units can be enlarged or moved to meet changing space requirements.

From tool sheds to large factory buildings Parkersburg installations are saving and serving in hundreds of different ways right across the board in industrial and commercial applications. It will pay you to look into this modern, low-cost way to provide additional facilities. Write to Department C-3.

*60 Years of Successful Service!*

**THE PARKERSBURG RIG & REEL COMPANY**
**Division of Parkersburg-Aetna Corporation**
**Parkersburg, West Virginia**

**Factory Locations:**
Parkersburg, West Virginia
Pomeroy, Ohio
Coffeyville, Kansas
Houston, Texas

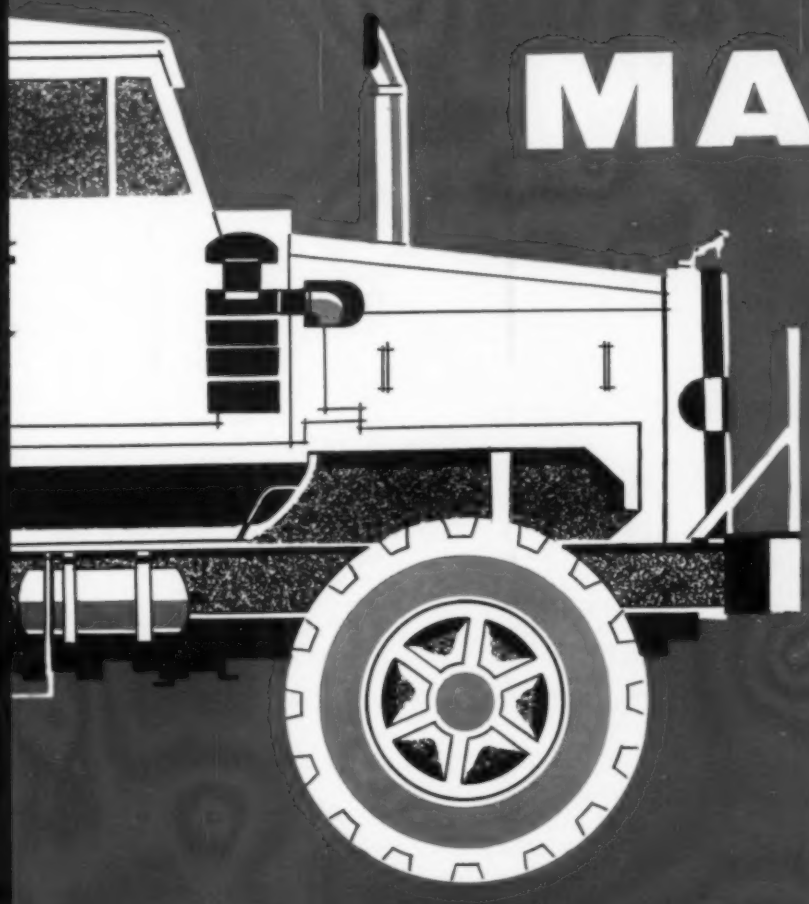
**Building Division Sales Offices:**
Dallas, Atlanta, New York, Chicago, Parkersburg

BUILDING PARKERSBURG DIVISION

"WISE IN THE WAYS OF METAL BUILDINGS"

# NEW MACK heavy-duty four- and six-wheel dumpers

## 15- to 34-ton capacity



### * LARGEST SELECTION OF HEAVY DUMPERS

Mack offers you the most complete line of dumpers for mining, quarrying, road building, construction. From heavy-duty 170 horsepower, four-wheel dumpers with 15-ton capacities to super-duty 400-horsepower, six-wheel dumpers with 34-ton capacities, Mack provides the economy and performance that can mean bigger hauling profits for you.

### * CHOICE OF ENGINES

Mack offers you a choice of engines . . . Cummins diesels in the 300- and 400-horsepower class . . . or Mack Thermodyne and Cummins diesels in the 170 to 205 horsepower class. No need to alter existing maintenance facilities to handle new engine makes . . . you get the truck you want with the engine you want.

### * OUTSTANDING PERFORMANCE

When you buy Macks, you know that you are getting top performance, outstanding economy, maximum dependability—qualities that have made Mack the acknowledged heavy-duty truck leader in the industry. Moreover, Mack dumpers are planned for accessibility throughout . . . engines are easily reached, no place in the suspension ever needs adjustment—these and many more Mack features reduce maintenance costs and make routine servicing easier. And in Macks, you get the finest transmissions and axles available . . . made by Mack and found only in Macks!

### * COMPETITIVELY PRICED

Mack off-highway dumpers are priced right in line with competitive makes. Yet, with Macks, you get those "extras" that mean more payloads at lower hauling costs . . . cabs engineered for maximum driver efficiency . . . specially designed components with extensive use of heat-treated alloy steels . . . single-unit all-welded frames that can take plenty of hard knocks . . . outstanding performance and economy from a complete line of engines.

### * STOCK DELIVERY

All 15 and 22½-ton Mack dumpers are available from stock. The units you want with the engines and transmissions you want can be supplied upon gratifyingly short notice. There are no delays, no production schedules for you to worry about. For more information on delivery, contact your local Mack Dealer or Representative.

# MACK LRX

**capacity: 15 tons**

This four-wheel, off-highway dumper combines a big 15-ton rated capacity with outstanding maneuverability. Either a Mack or Cummins diesel engine of the 200-horsepower class—along with heavy-duty clutch, 10-speed transmission, and Mack's Planidrive rear axle assembly—gives plenty of pulling power for long hauls on steep grades. Rugged, unified frame assembly, powerful air brakes, and comfortable cab with driver's position offset to the left assure the top performance and efficiency that have made the LRX a highly popular dumper in mine, quarry, and road-building operations.

## CONDENSED SPECIFICATIONS

### STANDARD EQUIPMENT

| DIMENSIONS: | 14.00-24 Rear Tire |
|---|---|
| Wheel Base | 12' 6" |
| Platform | 9' 1" |
| Overall Width | 10' 9½" |
| Overall Height | 10' 5" |
| Overall Height (Body Raised) | 18' 8" |
| Overall Length | 24' 7½" |
| Turning Circle Diam. (To outside edge of tire) | 60' |
| Weight (Chassis, Body & Hoist) | 33,000 lbs. |
| Payload | 30,000 lbs. |

**ENGINE (Diesel):**

| | |
|---|---|
| Model | END 673 |
| Make | Mack, Thermodyne |
| Type | Naturally aspirated |
| Number of cylinders | Six |
| Bore and stroke | 4⅛" x 6" |
| Piston displacement, cu. in. | 672 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 170 |
| Max. torque @ 1200 r.p.m. | 480 lb.-ft. |

**CLUTCH (Available with END 673 only):**

| | |
|---|---|
| Type | Mack single-plate, dry |
| Area of engagement, sq. in. | 253 |

**ELECTRICAL SYSTEM:**
Voltage and capacity . 12 V., 50 Amp. (24 V., Starting)

**TRANSMISSION:**

| | |
|---|---|
| Type | Mack selective, constant mesh |
| No. of speeds, forward | Nine |
| reverse | Two |

**FRONT AXLE:**
Make . Mack Reversed-Elliott, dropped forged I-beam

**REAR AXLE:**

| | |
|---|---|
| Make | Mack Planidrive |
| Drive | Dual Reduction |
| Final Drive (3rd reduction) | Planetary gear train within wheel hubs |
| Total Ratio | 16.5 |

**BRAKES (Air):**

| | |
|---|---|
| Compressor | Tu-Flo |
| Type | Internal expanding |
| Front, size | 17¼" x 5" x ¾" |
| Rear, size | 20" x 7" x ¾" |
| Hand, size | 12" x 5" x ⅜", Bendix |

**FRAME:**

| | |
|---|---|
| Side-members, size | 12½" x 6¼" x ½", wide flange I-beam, rolled section |
| Section modulus | 60.7 (per rail) |

**SPRINGS:**

| | |
|---|---|
| Front, type | Semi-elliptic |
| Rear, suspension | Semi-rigid, axle saddle mounted to frame |

**WHEELS:**
Type . . . . . Cast, spoke

**STEERING GEAR:**
Control . . . . . Manual

| TIRES: | Front | Rear |
|---|---|---|
| Size | 12.00-24 (16P) Rib | 14.00-24 (20P) Lug |

**CAB:**
**Type:** Heavy-duty off-highway, closed, all-steel welded. Offset 10¼" to left of chassis centerline provides clear vision for driver to rear.

**CHASSIS EQUIPMENT:** Front and rear tow pins; air horn on cab roof; cab entrance steps and platforms; rear view mirror, left side; channel type front bumper; dual windshield wipers; stop-tail light; rim lug wrench and handle.

**HOIST:**
Make & model . . . . . Heil
Type-Twin, double-acting, 8" diameter, hydraulic cylinders with 24" stroke, 70° dumping angle.

**BODY:**

| | |
|---|---|
| Type | Rock, with scoop end |
| Make | Heil |
| Capacity, line of plate | 9.8 cu. yds. struck |

**Construction:** ¼" steel plate shell bottom; ⅜" sides and header; ½" wear and side bevel plates; ¼" canopy. 3" x 5 lb. channels between floor plates either side of a 1⅝" edge-grain hardwood middle section filler.

### OPTIONAL EQUIPMENT

**ENGINE (Diesel):**

| | | |
|---|---|---|
| Model | NHB | ENDT 673 |
| Make | Cummins | Mack, Thermodyne |
| Type | Naturally aspirated | Turbocharged |
| Number of cylinders | Six | Six |
| Bore and stroke | 5¼" x 6" | 4⅛" x 6" |
| Piston displacement cu. in. | 743 | 672 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 200 | 205 |
| Max. torque @ r.p.m. | 1200 | 1400-1600 |
| pound-feet | 537 | 560 |

**CLUTCH (Included with NHB and ENDT 673):**

| | |
|---|---|
| Type | Mack two-plate, dry |
| Area of engagement, sq. in. | 416 |

| TIRES: | Front | Rear |
|---|---|---|
| Size | 13.00-24 (18P) Rib | 16.00-25 (20P) Lug |

**BODY:**

| | |
|---|---|
| Type | Flared Quarry |
| Make | Heil |
| Capacity, line of plate | 11 cu. yds. struck |

**Construction:** ¼" steel plate shell bottom; ½" sides; ⅜" header; ½" wear and side bevel plates; ¼" canopy. 3" x 5 lb. channels between floor plates either side of a 1⅝" edge-grain hardwood middle section filler.

**Exhaust Heating:** Provisions for exhaust heating of dump body available.

**Body Equipment:** (for std. and opt. bodies): (9) ¾" x 6" alloy wear bars; rock ejectors; ½" alloy wear plate; welded-on side boards (for std. body only).

**CHASSIS EQUIPMENT:** Automatic radiator shutters; Wagner "BB" (24 hour chart 0-3500 r.p.m.) tachograph, in place of standard tachometer; speedometer; hubodometer, left front wheel; Vickers power steering; front wheel limiting valve; hand control valve to operate rear service brakes; low air pressure indicator, Wig-Wag type; radiator guard; 25,000 B.T.U. hot water cab heater with defrosters; spare rim; hydraulic jack, 20-ton; air starting.

# MACK LRSW

**capacity: 30 tons**

Powered by a 300-horsepower engine, this 30-ton, six-wheel dumper has what it takes for off-highway operation in mines, quarries and earth-moving projects. Smooth application of power to its balanced, four-wheel drive bogie is obtained by an air-assisted clutch and overgear transmission with two-speed compound or torque converter. Convenient location of controls, angle steering column, hydraulic steering booster, and extreme left driver position give easy and efficient handling. Best materials, precision manufacture, and specially engineered components make the LRSW capable of withstanding the toughest 'round-the-clock hauling.

## CONDENSED SPECIFICATIONS

### STANDARD EQUIPMENT

**DIMENSIONS:**

| | |
|---|---|
| Wheelbase | 16′ 10″ |
| Platform | 14′ 11½″ |
| Overall Width | 11′ 1⅝″ |
| Overall Height | 11′ 5⅛″ |
| Overall Length | 29′ 4″ |
| Overall Height (Body Raised) | 24′ 10″ |
| Turning Circle Diam. (To outside edge of tire) | 78′ |
| Weight (chassis, body & hoist) | 60,000 lbs. |
| Payload | 60,000 lbs. |

**ENGINE (Diesel):**

| | |
|---|---|
| Model | NHRBIS |
| Make | Cummins |
| Type | Supercharged |
| Number of cylinders | 6 |
| Bore and stroke | 5½″ x 6″ |
| Piston displacement, cu. in. | 743 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 300 |
| Max. torque @ 1500 r.p.m. | 818 lb.-ft. |

**CLUTCH:**

| | |
|---|---|
| Type | Mack two-plate, dry |
| Area of engagement, sq. in. | 416 |
| Actuation | Manual, with air assist |

**ELECTRICAL SYSTEM:**

| | |
|---|---|
| Voltage and capacity | 12 V., 50 Amp. with 24 V., starting |

**TRANSMISSION:**

| | |
|---|---|
| Type | Mack two-lever, Duplex |
| No. of speeds, forward | Eight |
| reverse | Two |

**FRONT AXLE:**
Type — Mack Reversed-Elliott, drop forged I-beam

**BOGIE:**

| | |
|---|---|
| Make | Mack Planidrive |
| Final drive, type | Four-wheel, planetary |
| Inter-axle differential, type | Mack concentric cam and plunger Power Divider |
| Carriers | Mack Dual Reduction |
| Total Ratio | 18.18 |

**BRAKES:**

| | |
|---|---|
| Type and actuation | Internal expanding, inclosed, air |
| Front, size | 17¼″ x 5″ x ¾″ |
| Rear, size | 20″ x 7″ x ¾″ |
| Hand, size | 16″ x 3″ x ¼″, four-shoe, disc |

**FRAME:**

| | |
|---|---|
| Type | I-beam, wide flange |
| Material | Alloy steel |
| Side-members, size | 13 15/16″ x 8″ with ⅝″ web and top flange, ⅞″ bottom flange |
| Section modulus | 84.5 per rail |

**SPRINGS:**

| | |
|---|---|
| Type, front | Semi-elliptic |
| rear | Semi-elliptic, inverted |
| Suspension, Mack | Rubber Shock Insulators |

**SHOCK ABSORBERS, FRONT:**
Type — Houdaille, hydraulic

| TIRES (Lug): | Front | Rear |
|---|---|---|
| Size | 14.00-24 (20P) | 16.00-25 (20P) |

**WHEELS** — Cast, spoke

**STEERING GEAR:**
Power steering assist — Vickers hydraulic booster

**CAB:**
Type — Heavy-duty off-highway, closed, all-steel, welded. Offset 10¼″ to left of chassis centerline provides clear vision for driver to rear.

**CHASSIS EQUIPMENT:** Hubodometer; screen type radiator guard; front and rear tow pins; air horn; rear view mirror, left side; exhaust through hood with in-line muffler; channel type front bumper; door in hood side for access to oil filler and dip stick; insulating dash mat; wig-wag low air pressure indicator; windshield wipers; stop and tail light; back up light; rim lug wrench and handle.

**HOIST:**
Make — Heil
Type—Twin, double-acting, 10″ diameter, hydraulic cylinders with 40″ stroke, 70° dumping angle with power return.

**BODY:**

| | |
|---|---|
| Make and type | Heil, Rock-scoop end |
| Capacity, line of plate | 21 cu. yds. |

**Construction:** ¼″ steel plate shell bottom; ⅜″ sides and header; ½″ wear and side bevel plates; ⅛″ canopy. 3″ x 7.1 lb. channels between floor plates either side of a 2″ edge-grain hardwood middle section filler.

### OPTIONAL EQUIPMENT

**ENGINE:**

| | |
|---|---|
| Make and model | Cummins, NRTO |
| Number of cylinders | Six |
| Bore and stroke | 5½″ x 6″ |
| Piston Displacement cu. in. | 743 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 335 |
| Max. torque @ 1500 r.p.m. | 900 lb.-ft. |
| Turbocharger | Turbine, exhaust driven |

**TRANSMISSIONS:**
Westinghouse Converter and Mack 4-Speed Transmission. Clutch—2-plate, 17″.
Allison Torqmatic Converter and Allison Transmission

**WHEELS, TIRES:**

| | |
|---|---|
| Front & rear Wheels, type | Cast spoke |
| Tires, size | 16.00-25 |
| Ply-rating, front | 20 or 24 |
| rear | 24 |

**BODY EXHAUST HEATING:** Provisions to permit passage of exhaust gases through area between wear plate and shell bottom; controlled by baffles and exhausted through second rear vertical bolster on right side.

**CHASSIS EQUIPMENT:** Front wheel brake limiting valve; separator for air system; 25,000 B.T.U. heater with defrosters; windshield defroster fan; engine chrome cylinder liners and stellite inlet valve seats; tachograph, Wagner "BB", 24-hour chart 0-3500 r.p.m. (in place of standard tachometer); speedometer (single-hand); exhaust outlet under cab suitable for attachment to body for body heating; automatic (air) radiator shutters; 20-ton jack, hydraulic; spare rim.

# MACK LVX

**capacity: 22½ tons**

This four-wheel dumper with its 22½-ton rated capacity provides maximum payloads at minimum unit cost. Equipped with a 300-horsepower engine, over-gear transmission with two-speed compound or torque converter, and Mack's exclusive Planidrive rear axle assembly, it is powered to give top performance under the most punishing operating conditions.

All-welded, single-unit, alloy-steel frame gives LVX's stamina and rugged durability. Elbow steering column, hydraulic steering booster, two-plate air-assisted clutch, and job-engineered cab with extreme left driver position assure maximum operating efficiency. From top to bottom, this big Mack gives you the "extras" that mean minimum hauling costs.

## CONDENSED SPECIFICATIONS

### STANDARD EQUIPMENT

**DIMENSIONS:**

| | |
|---|---|
| Wheelbase | 14′ 2″ |
| Platform | 9′ 11″ |
| Overall Width | 11′ 2″ |
| Overall Height | 11′ 6¼″ |
| Overall Length | 26′ 8½″ |
| Overall Height (Body Raised) | 21′ |
| Turning Circle Diam. (To outside edge of tire) | 62′ |
| Weight (chassis, body & hoist) | 40,800 lbs. |
| Payload | 45,000 lbs. |

**ENGINE (Diesel):**

| | |
|---|---|
| Model | NHRBIS |
| Make | Cummins |
| Type | Supercharged |
| Number of cylinders | Six |
| Bore and stroke | 5½″ x 6″ |
| Piston displacement, cu. in. | 743 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 300 |
| Max. torque @ 1500 r.p.m. | 818 lb.-ft. |

**CLUTCH:**

| | |
|---|---|
| Type | Mack Two-plate, dry |
| Area of engagement, sq. in. | 416 |
| Actuation | Manual, with air assist |

**ELECTRICAL SYSTEM:**
Voltage and capacity . 12 V., 50 Amp. (24 V. Starting)

**TRANSMISSION:**

| | |
|---|---|
| Type | Mack selective, constant mesh |
| No. of speeds, forward | Eight |
| reverse | Two |

**FRONT AXLE:**
Type . . . Mack Reversed-Elliott, drop forged I-beam

**REAR AXLE:**

| | |
|---|---|
| Make | Mack Planidrive |
| Drive | Dual reduction, spiral bevel |
| Final drive (3rd reduction) | Planetary gear train within wheel hubs |
| Total Ratio | 17.66 |

**BRAKES (Air):**

| | |
|---|---|
| Compressor | Tu-Flo |
| Type | Internal expanding |
| Front, size | 17¼″ x 5″ x ¼″ |
| Rear, size | 18″ x 10″ x ⅜″ |
| Hand, size | 16″ x 3″ x ¼″ |

**FRAME:**

| | |
|---|---|
| Type | I-beam, wide flange |
| Material | Alloy steel |
| Side-members, size | 13$^{11}/_{16}$″ x 8″ x ⅝″ (Fabricated) |
| Section modulus | 74.8 per rail |

**SPRINGS:**

| | |
|---|---|
| Front | |
| Type | Semi-elliptic |
| Suspension | Mack rubber shock insulators |
| Rear | |
| Type | Progressive rate, semi-elliptic |
| Suspension | Cam face slipper ends with radius rods |

**TIRES:**

| | Front | Rear |
|---|---|---|
| Size | 14.00-24 (16P) Rib | 18.00-25 (24P) Lug |

**WHEELS:**
Type . . . Cast, spoke

**STEERING GEAR:**
Power steering assist . . . Vickers hydraulic booster

**CAB:**
Type . Heavy-duty off-highway, closed, all-steel, welded. Cab offset 10¾″ to left of chassis centerline provides clear vision for driver to rear.

**CHASSIS EQUIPMENT:** Screen type radiator guard; front and rear tow pins; air horn on cab roof; dual windshield wipers; two air reservoirs; rear view mirror, left side; exhaust through hood with inline muffler; channel type front bumper; stop-tail light; rim lug wrench and handle.

**HOIST:**
Type . . . Twin, double-acting, outboard mounted, three section telescopic cylinder assembly directly connected to body and chassis through a universal joint arrangement providing a 70° dumping angle.

**BODY:**

| | |
|---|---|
| Type | Rock, with scoop end |
| Make | Heil |
| Capacity, line of plate | 14.8 cu. yds. struck |

**Construction:** ¼″ steel plate shell bottom; ⅜″ sides and header; ½″ wear and side bevel plates; ¼″ canopy. 3″ x 7.1 lb. channels between floor plates either side of a 2″ edge-grain hardwood middle section filler.

### OPTIONAL EQUIPMENT

**ENGINE:**

| | |
|---|---|
| Model | NRTO |
| Make & type | Cummins, turbocharged |
| Number of cylinders | Six |
| Bore and stroke | 5½″ x 6″ |
| Piston displacement, cu. in. | 743 |
| Brake H.P. @ 2100 r.p.m. (gov.) | 335 |
| Max. torque @ 1500 r.p.m. | 900 lb.-ft. |

**TRANSMISSIONS:**
Westinghouse Converter and Mack 4-Speed Transmission. Clutch—2-plate, 17″.
Allison Torqmatic Converter and Allison Transmission.

**FRONT AXLE:** Special Heavy-duty, Reversed-Elliott, Drop Forged I-beam.

**TIRES:**

| | Front |
|---|---|
| Size | 14.00-24 (20P) Rib |

**BODY:**

| | |
|---|---|
| Type | Flared Quarry |
| Make | Heil |
| Capacity, line of plate | 15 cu. yds., struck |

**Construction:** ¼″ steel plate shell bottom; ½″ sides; ⅜″ header; ½″ wear and side bevel plates; ¼″ canopy. 3″ x 7.1 lb. channels between floor plates either side of a 2″ edge-grain hardwood middle section filler.

**Exhaust Heating:** Provision for exhaust heating of dump body available.

**CHASSIS EQUIPMENT:** Air starting, Ingersoll-Rand 9HP; Tachograph, Wagner "BB" (24 hour chart 0-3500 r.p.m.) in place of standard tachometer; Wig-Wag low air pressure indicator; hand control valve to operate rear service brakes; front wheel brake limiting valve; 25,000 B.T.U. hot water cab heater with defrosters; windshield fan mounted on windshield header; hub-odometer; air operated radiator shutter; Schwitzer air operated Thermo-controlled radiator fan hub; speedometer; back-up light; hydraulic jack, 20-ton; spare rims.

# only MACK gives you features like these...

## MACK-BUILT FRONT AXLES

Mack's reversed Elliott, forged I-beam front axles are made extra strong for long, trouble-free service. Extensive use of heat-treated steels for crucial parts means minimum maintenance. Straight tie rod and rugged construction of air-actuated brake shoes insure top performance.

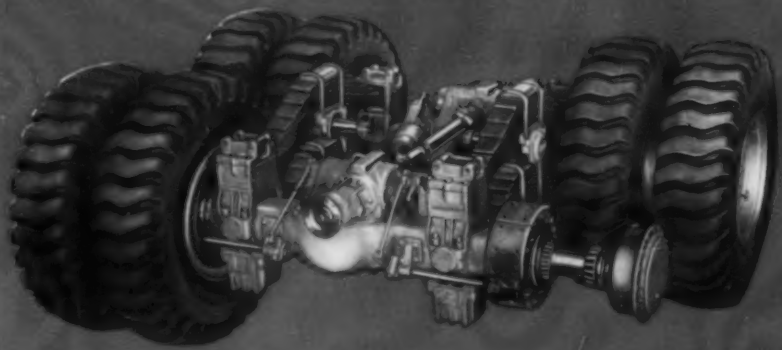
## MACK-BUILT 2-WHEEL REAR AXLES

Mack's two-wheel, rear axle assemblies have an unmatched reputation for durability under strenuous service. The strongest, most wear-resistant materials are used throughout. Dual reduction, gear-type differential and Mack's famous planetary gear reduction at the wheel hubs (Planidrive) provide the smooth distribution of power needed for top truck performance. Planetary gears can be serviced or repaired without removing tires or disturbing wheel bearing adjustment.

## MACK-BUILT TRANSMISSIONS

Dependable performance and long life are standard in Mack transmissions. Shown here is the heavy-duty overgear transmission used for the LRVSW, LRSW, and LVX off-highway dumpers. The four-speed main transmission and two-speed compound are assembled as a unit to give eight forward and two reverse speeds. The four-speed main transmission without the two-speed compound is offered in combination with torque converter. All gears use Mack tetrapoid or quadrapoid tooth design and are drop-forged, case-hardened, and generator-ground . . . gears noted for lasting the life of the truck.

## MACK-BUILT 4-WHEEL BALANCED BOGIES WITH EXCLUSIVE POWER DIVIDER



Under the worst conditions of mud, loose gravel, or difficult terrain, you get maximum pulling power with Mack's four-wheel drive Balanced Bogies because exclusive Mack Power Dividers apply power to the wheels with traction. Planidrive final reduction gears in all four hubs provide needed reduction without excessively large carriers, differentials, or axle shafts. Maintenance is reduced to a minimum.

# MACK LRVSW

**capacity: 34 tons**

The 34-ton rated capacity of this super-payload, six-wheel dumper assures minimum haulage costs for the big earth-moving jobs. Equipped with a 400-horsepower engine, four-speed overgear transmission, hydraulic torque converter or two-speed compound, and a balanced, four-wheel drive bogie, LRVSW's can negotiate severe grades fully loaded. Maneuverability and ease of handling are facilitated by such features as a hydraulic steering booster and air-assisted clutch. Heat-treated, stress-proportioned, single-unit frame gives the structural stamina needed to withstand severest operating conditions. All these features, and many more, contribute to unmatched durability and minimum haulage costs.

## CONDENSED SPECIFICATIONS

### STANDARD EQUIPMENT

**DIMENSIONS:**

| | |
|---|---|
| Wheelbase | 16' 10" |
| Platform | 14' 11½" |
| Overall Width | 11' 1⅝" |
| Overall Height | 11' 11" |
| Overall Length | 31' 7" |
| Overall Height (Body Raised) | 25' 2" |
| Turning Circle Diameter (To outside edge of tire) | 78' |
| Weight (chassis, body & hoist) | 68,000 lbs. |
| Payload | 68,000 lbs. |

**ENGINE (Diesel):**

| | |
|---|---|
| Model | NVH-1200 |
| Make | Cummins |
| Type | Naturally aspirated |
| Number of cylinders | 12 |
| Bore and stroke | 5½" x 6" |
| Piston displacement, cu. in. | 1486 |
| Brake horsepower @ 2100 r.p.m. (gov.) | 400 |
| Max. torque @ 1200 r.p.m. | 1,075 lb.-ft. |
| Fuel tank and location | 150 gal., back of cab |

**CLUTCH:**

| | |
|---|---|
| Make | Lipe Rollway |
| Type | Two-plate, dry |
| Area of engagement, sq. in. | 571 |
| Actuation | Manual, air assist |

**ELECTRICAL SYSTEM:**

| | |
|---|---|
| Voltage and capacity | 12 V., 75 Amp. |
| Generator, make and type | Leece-Neville, alternator |

**STARTING SYSTEM:**

| | |
|---|---|
| Starting motor, type | Air |
| Make | Bendix-Westinghouse |
| Rating, horsepower | 25 |
| Cold starting aid | Ether injection |

**TRANSMISSION:**

| | |
|---|---|
| Type | Mack selective constant mesh |
| No. of speeds, forward | Four |
| reverse | One |

**TORQUE CONVERTER:**

| | |
|---|---|
| Model | Westinghouse 18" |
| Type | Single stage, hydraulic |

**FRONT AXLE:**

| | |
|---|---|
| Type | Mack Reversed-Elliott, I-beam drop forged |

**BOGIE:**

| | |
|---|---|
| Make | Mack Planidrive |
| Final drive, type | Four wheel, planetary |
| Inter-axle Differential | Mack concentric cam and plunger type Power Divider |
| Carriers | Mack dual reduction |
| Total ratio | 18.18 |

**BRAKES:**

| | |
|---|---|
| Type and actuation | Internal expanding, inclosed, air |
| Front, size | 17¼" x 5" x ¼" |
| Rear, size | 20" x 7" x ¼" |
| Hand, size | 16" x 3" x ¼", four-shoe, disc |

**FRAME:**

| | |
|---|---|
| Type | I-beam, wide flange |
| Material | Alloy steel |
| Side-members, size | Depth 14¼", flange width 8", flange thickness 1" |
| Section modulus | 130.0 per side |

**SPRINGS:**

| | |
|---|---|
| Type | Semi-elliptic |
| Suspension, Mack | Rubber Shock Insulators |

**SHOCK ABSORBERS, FRONT:**

| | |
|---|---|
| Type | Houdaille, hydraulic |

**TIRES (Lug) Front and Rear:**

| | |
|---|---|
| Size | 16.00-25 (20P) |

**WHEELS:**

| | |
|---|---|
| Type | Cast, spoke |

**STEERING GEAR:**

| | |
|---|---|
| Type | Worm and roller |
| Power steering assist | Vickers hydraulic booster |

**CAB:**

Type . . Heavy-duty off-highway, closed, all-steel, welded. Offset 10¾" to left of chassis centerline provides clear vision for driver to rear.

**CHASSIS EQUIPMENT:** Screen type radiator guard; hubodometer; front and rear tow pins; air horn; rear view mirror, left side; dual exhaust through hood with inline mufflers; channel type front bumper; rim lug wrench and handle; door in hood side for access to oil filler and dip stick; insulating dash mat; windshield wipers; stop and tail light; back up light.

**HOIST:**

Make & Type . . Heil, twin, double-acting, outboard mounted, four-section telescopic cylinder assembly directly connected to body and chassis through a universal joint arrangement to provide maximum flexibility.

Dumping angle . 70°

**BODY:**

| | |
|---|---|
| Make & Type | Heil Rock, scoop end |
| Capacity, line of plate | 24 cu. yds. struck |

**Construction:** ¼" steel plate shell bottom; ⅜" sides and header; ½" wear and side bevel plates; ¼" canopy. 3" x 7.1 lb. channels between floor plates either side of a 2" edge-grain hardwood middle section filler.

### OPTIONAL EQUIPMENT

**TRANSMISSION (In place of 4-Speed and Westinghouse Converter):**

| | |
|---|---|
| Make & Type | Mack Two-Lever, Duplex |
| Speeds Forward | 8 |
| Speeds Reverse | 2 |

**TIRES (Lug) Front and Rear:**

| | |
|---|---|
| Size | 16.00-25 (24P) |

**BODY EXHAUST HEATING:** Provisions to permit passage of exhaust gases through area between wear plate and shell bottom; controlled by baffles and exhausted through second rear vertical bolster on right side.

**CHASSIS EQUIPMENT:** Front wheel brake limiting valve; 25,000 B.T.U. heater with defrosters; windshield fan; speedometer (single-hand); tachograph, Wagner "88"—24-hour chart, 0-3500 r.p.m. (in place of standard tachometer); engine fan—Schwitzer-Cummins fan drive with automatic temperature control; exhaust outlet under cab suitable for attachment to body for body heating; 20-ton hydraulic jack; spare rim.

# MACK first name for TRUCKS

**Mack Trucks, Inc., Plainfield, New Jersey • In Canada: Mack Trucks of Canada, Ltd.**

# Thermocoal Belting

## EVERYTHING THE U.S.B.M. REQUIRES*

## ...and more!

When you order conveyor belting for underground coal mine use, be sure it's new, fire-resistant Thermocoal—the belt that bears acceptance designation #28-13 of the U.S. Bureau of Mines.

You'll not only have a belt that meets or exceeds all after-flame and after-glow tests . . . you'll also benefit from typical Thermoid toughness. Thermocoal Belts are engineered for high resistance to flexing and impact, edge wear, abrasion and mildew. You can specify either 4 or 6 ply construction of the strongest cotton or cotton-nylon duck—impregnated with specially compounded Thermoid rubber stocks to assure longer life, lower costs.

*U.S.B.M. acceptance designation #28-13.

*Order Thermocoal Belting through your Thermoid Distributor, or write direct for detailed information and data sheets.*

**Make Thermoid your choice, too, for Multi-V Belts...**

**. . . and Hose manufactured with your needs in mind.**

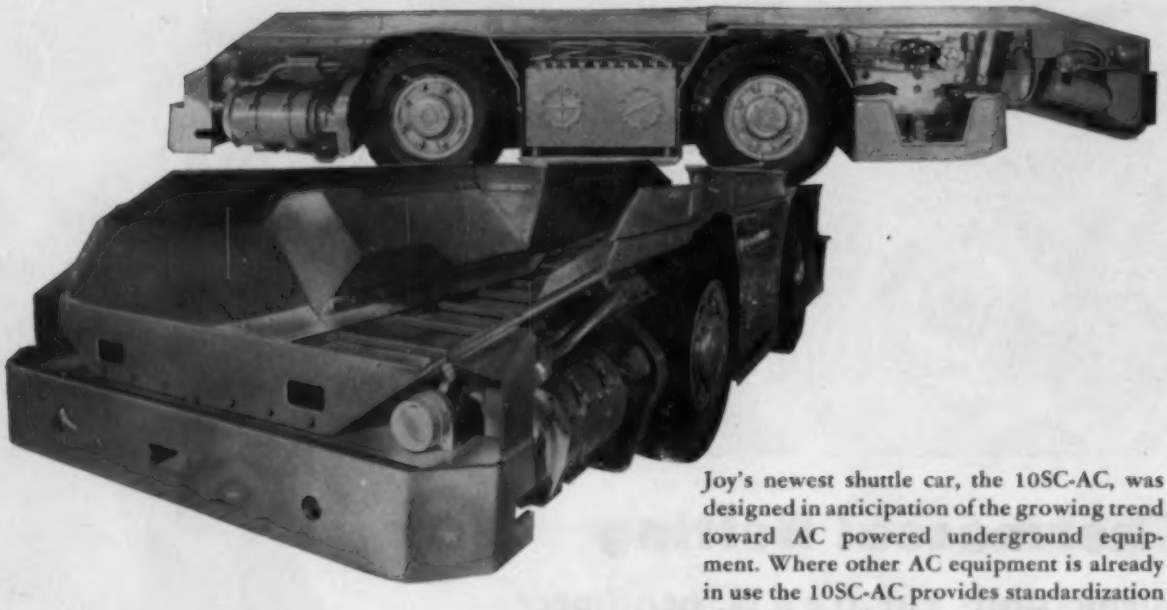
**Thermoid**

**Thermoid Company**
**Trenton, New Jersey**
**Nephi, Utah**

# A NEW SHUTTLE CAR

# the JOY 10SC-AC

## IN OPERATION SINCE MID '56



Joy's newest shuttle car, the 10SC-AC, was designed in anticipation of the growing trend toward AC powered underground equipment. Where other AC equipment is already in use the 10SC-AC provides standardization of power supplies throughout the mine . . . makes stocking and purchasing problems simpler. But more important, the 10SC-AC brings the powerful performance and extremely low maintenance of AC motors into the shuttle car field for the first time.

Two constant-horsepower, 2-speed traction motors, rated at 25 horsepower each, drive the car . . . eliminating all clutches, transmissions, and cross-drive shafts. Shifting is done automatically, electrically . . . fewer mechanical parts . . . less maintenance. Two constant-torque, 2-speed conveyor motors, 10 horsepower each, power the conveyor by direct drive without complicated transmission systems or complex gearing. These design features closely follow the proved design of Joy's DC driven car, the 10-SC, operating in the field for almost ten years.

*4-wheel drive and 4-wheel steering makes the 10SC-AC extremely maneuverable in closely timbered areas.*

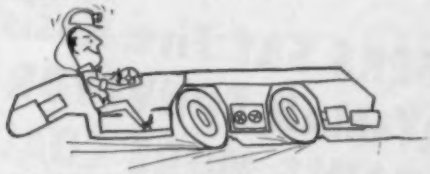
*See it at the COAL SHOW*

WBW CL 8419-144

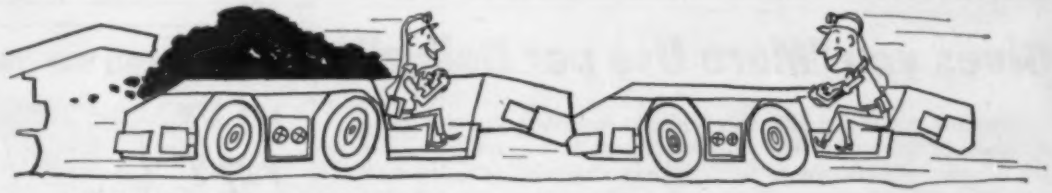
# —operating on ALTERNATING CURRENT

*The Joy 10SC-AC car easily carries 10 tons of material even on rough bottoms.*

**LESS MAINTENANCE**—Alternating current motors are trouble free—no servicing of brushes, brush holders and studs . . . not even hand holes on the motors.



**REGENERATIVE BRAKING**—Standard equipment on the 10SC-AC. On down-grade, braking automatically occurs when motors are driven over their synchronous speeds.



**SAME SPEED LOADED OR EMPTY**—AC motors power the 10SC-AC at almost the same speed whether loaded or empty . . . keeps several cars on an even cycle . . . eliminates jams and waiting at loading point.

**WRITE FOR BULLETIN 144-1**

A complete description of the 10SC-AC including dimension drawings, specifications and performance curves.

**PROVED PERFORMANCE**—The basic design of the car is the Joy 10-SC . . . in the field since 1948. New 10SC-AC's are now working coal.

**JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.**

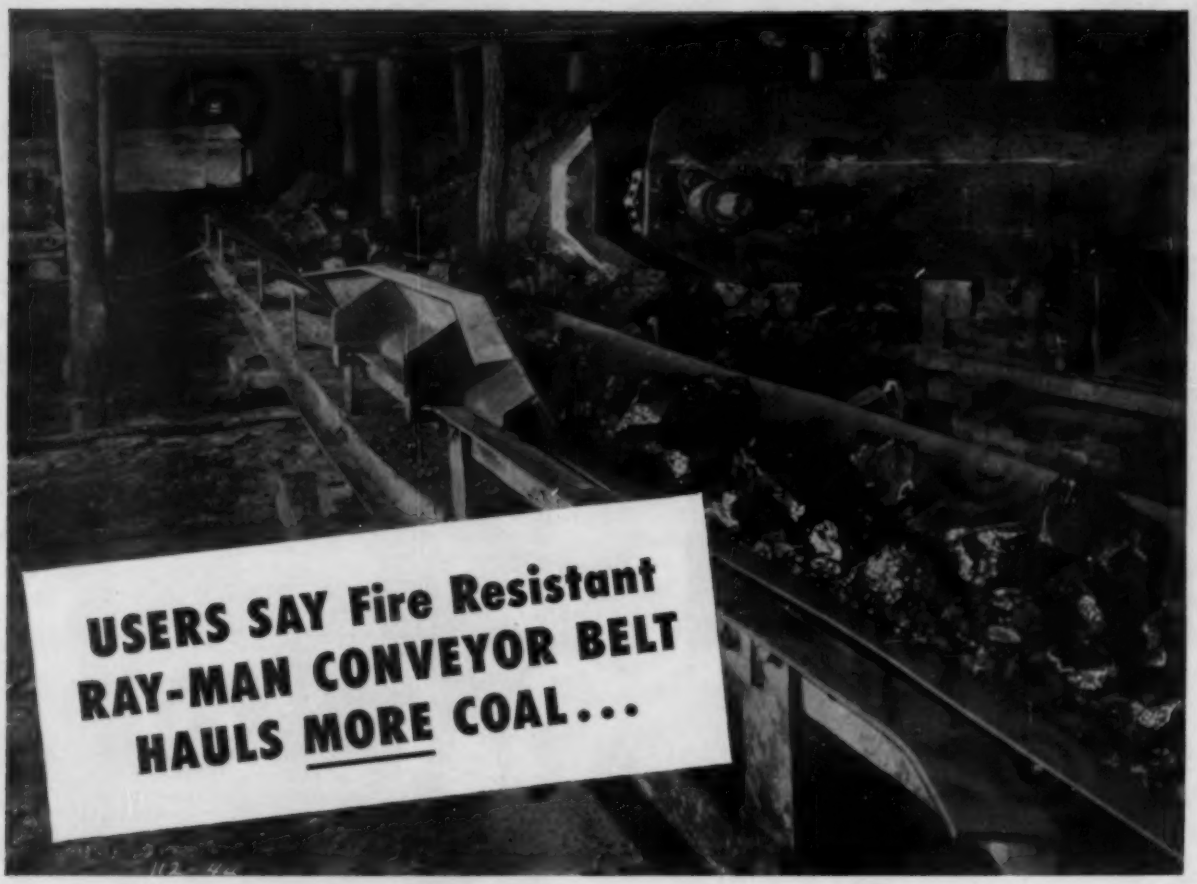
**EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY**

CONTINUOUS MINERS

COAL LOADERS

COAL DRILLS

COAL CUTTERS



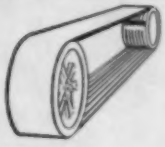

## ...Gives you "More Use per Dollar"

R/M engineering makes the difference! Special cushioned strength members are made of newest special industrial fibers. Strong, resilient outer plies are double compensated to relieve stress and provide exceptional flexibility. Ray-Man Conveyor Belt trains naturally, troughs easily... handles *fuller, heavier* loads even where small pulleys are required in low-head room installations!

Resists gouging, tearing and ripping better than other constructions. Requires no breaker strip. R/M's exclusive "XDC" Cover gives the belt much greater protection against wear, tear, cuts and abrasions. It's mildew-proof, moisture resistant and—*now*—available in special construction with Bureau of Mines' acceptance designation: "Fire Resistant, U.S.B.M. No. 28-10." You can't use a *better handling, longer lasting... safer* belt in your underground mining operations!

Let an R/M representative show you special advantages of other feature R/M conveyor belts... extra-cushioned Homocord, for unusually abrasive shock loading... R/M Tension-Master for extra long slope lifts, high tensions. Whatever your requirements, if you *specify* R/M Conveyor Belts ... you *get* "More Use per Dollar." Write for Conveyor Belt Bulletins.

### More Dependable Mine Drives with R/M *Poly-V*®



This patented new concept in heavy duty drive transmission delivers up to 50% *more* power in the *same* space as ordinary V-belts... *equal* power in *less* space! It employs a *single*, V-ribbed belt... eliminates "matching" problems... cuts belt and sheave inventories to a new low! Write for a copy of Poly-V® Drive Bulletin #6638 *today!*

**Poly-V is a registered Raybestos-Manhattan trademark.*

RM-710

BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

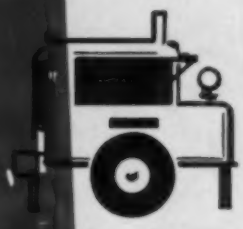
## RAYBESTOS-MANHATTAN, INC.

Other R/M products: Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

*Got a tough job?*

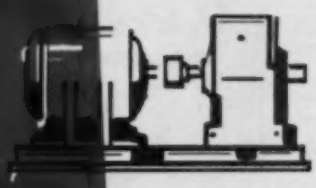
# Give it to STANOIL Industrial Oil

*This oil gives superior lubrication to a long list of mine equipment—here are three big jobs it can do—*



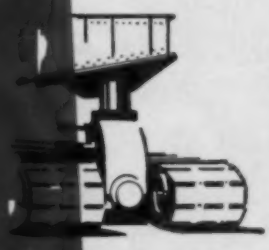
**COMPRESSOR**

High oxidation stability and low carbon-forming characteristics of STANOIL virtually eliminate the danger of carbon deposits on valves. STANOIL separates readily from water. There is no problem of emulsion in compressor crankcase.



**SPEED REDUCER**

There are many years between maintenance jobs on speed reducers when STANOIL is the lubricant. Herringbone gears remain clean and free of wear. Low pour point of STANOIL gives oil ability to flow freely from a cold start. No trouble either in prolonged, high temperature operation.



**HYDRAULIC JACKS**

Tough mine hydraulic service is the ideal place for STANOIL. High viscosity index and low pour point of STANOIL assure smooth operation no matter what the temperature. STANOIL resists contamination, will not emulsify.

Pick your tough lubrication jobs, give them to STANOIL Industrial Oil and get the results you have wanted. Find out more. Call your Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. He is experienced in mine lubrication. Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

*Quick Facts About*

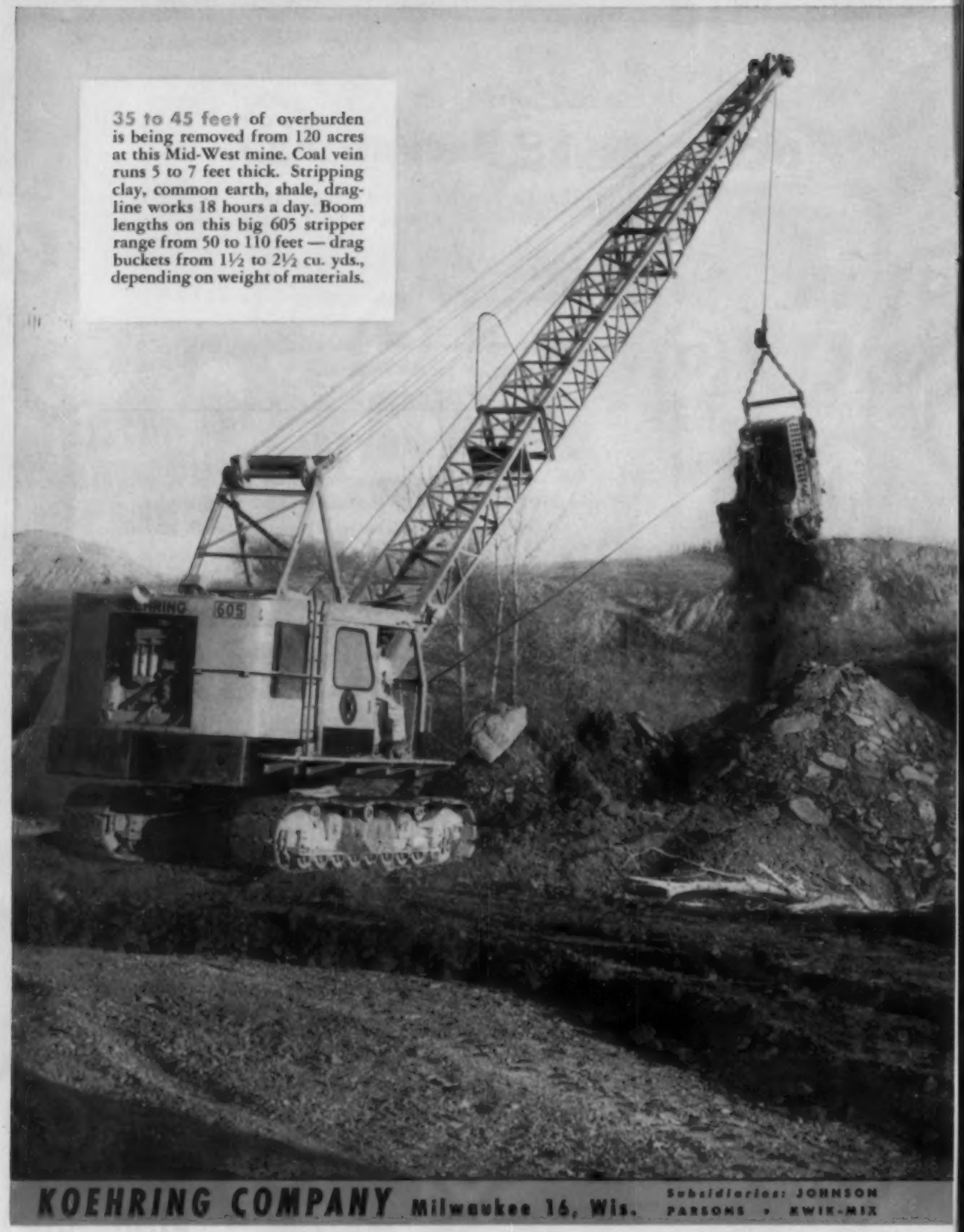
**STANOIL Industrial Oil**

- **Stability**—STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- **Rust Prevention**—Inhibitor in STANOIL "plates out" on metal surfaces, prevents corrosion.
- **Cold Starts**—STANOIL has low pour point. Flows freely from cold start. No need for costly warm-ups.
- **Resists Effects of Temperature Change**—STANOIL has high viscosity index, is resistant to temperature change.
- **Has Excellent Demulsibility**—STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.

STANDARD OIL COMPANY
(Indiana)

STANDARD

## KOEHRING WORK CAPACITY *in action . . .*




**35 to 45 feet** of overburden is being removed from 120 acres at this Mid-West mine. Coal vein runs 5 to 7 feet thick. Stripping clay, common earth, shale, dragline works 18 hours a day. Boom lengths on this big 605 stripper range from 50 to 110 feet — drag buckets from 1½ to 2½ cu. yds., depending on weight of materials.

**KOEHRING COMPANY** Milwaukee 16, Wis.

Subsidiaries: JOHNSON · PARSONS · KWIK-MIX

**Meet the 405** — new heavy-duty leader in the 1-yard class. Operators like its ease of control, big power clutch, automatic traction brakes, and simple 2-shaft design of upper machinery. *You'll* like its big work capacity with all attachments: 1-yard shovel or hoe, 1 to 1½-yard clam or dragline, 20-ton crane.

**Pan-handler** — In an Eastern quarry, slabs of sandstone are palletized on pans for quick pick-up, and loaded on trucks. Pans weigh an average of 3½ tons — an easy lift for the Koehring 205 truck crane. Constantly moving to various piles around the quarry, it easily loads 24 pans an hour, according to quarry foreman. With this mobile 205 crane they are equipped to handle loads up to 15 tons.

**At rail siding,** 305 clamshell crane speeds transfer of material from gondola cars to trucks. Its fast swing and wide work radius pay off on any material-handling. This heavy-duty 305 is another in a modern, new series of Koehring extra-capacity excavators and cranes. Look them over. They're all listed in accompanying chart.

## Here are some figures that will interest you:

| KOEHRING MODEL | SIZE DIPPER | LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load.) | |
|---|---|---|---|
| 205 CRAWLER | ½-Yd. | 20,000 lbs. | at 10-foot radius |
| 205 ON RUBBER | ½-Yd. | 30,000 lbs.<br>13,700 lbs. | at 12-foot radius<br>at 20-foot radius |
| 305 CRAWLER | ¾-Yd. | 30,000 lbs. | at 12-foot radius |
| 305 ON RUBBER | ¾-Yd. | 50,000 lbs.<br>15,800 lbs. | at 10-foot radius<br>at 30-foot radius |
| 405 CRAWLER | 1-Yd. | 40,000 lbs. | at 12-foot radius |
| 605 CRAWLER | 1½-Yds. | 72,300 lbs. | at 12-foot radius |
| 1205 CRAWLER | 3-Yds. | 190,000 lbs. | at 13-foot radius |

KOEHRING HEAVY DUTY

Want more information? Call Koehring distributor today.

# Answers to

## about Kaiser Aluminum's purchase of

*As part of its continuing growth program, Kaiser Aluminum & Chemical Corporation recently purchased the Wire and Cable Division of United States Rubber Co., located at Bristol, Rhode Island. The purchase raises a number of questions that are of direct interest to customers of both Kaiser Aluminum and the former Wire and Cable Division of U. S. Rubber. Here are the answers to those questions.*

**Q. Will all of the U.S. Rubber products still be available?**

**A.** Yes, ALL of the wire and cable products formerly offered by U.S. Rubber will continue to be produced and sold—without changes of any kind.

**Q. Who will back up the U.S. Rubber guarantees now? What about replacement?**

**A.** Kaiser Aluminum will guarantee all U.S. Rubber Wire and Cable Division products now in use on the same terms as originally established, including replacement. Former U.S. Rubber products (which will continue to be offered) will carry the same guarantees as before.

**Q. I have always liked the way U.S. Rubber people have served my needs; who will be doing the job now?**

**A.** The same people who served you before will serve you now. The purchase includes acquisition of Wire and Cable Division's nationwide sales organization, as well as the plant work force of 1200 people.

**Q. Will the price structure remain the same?**

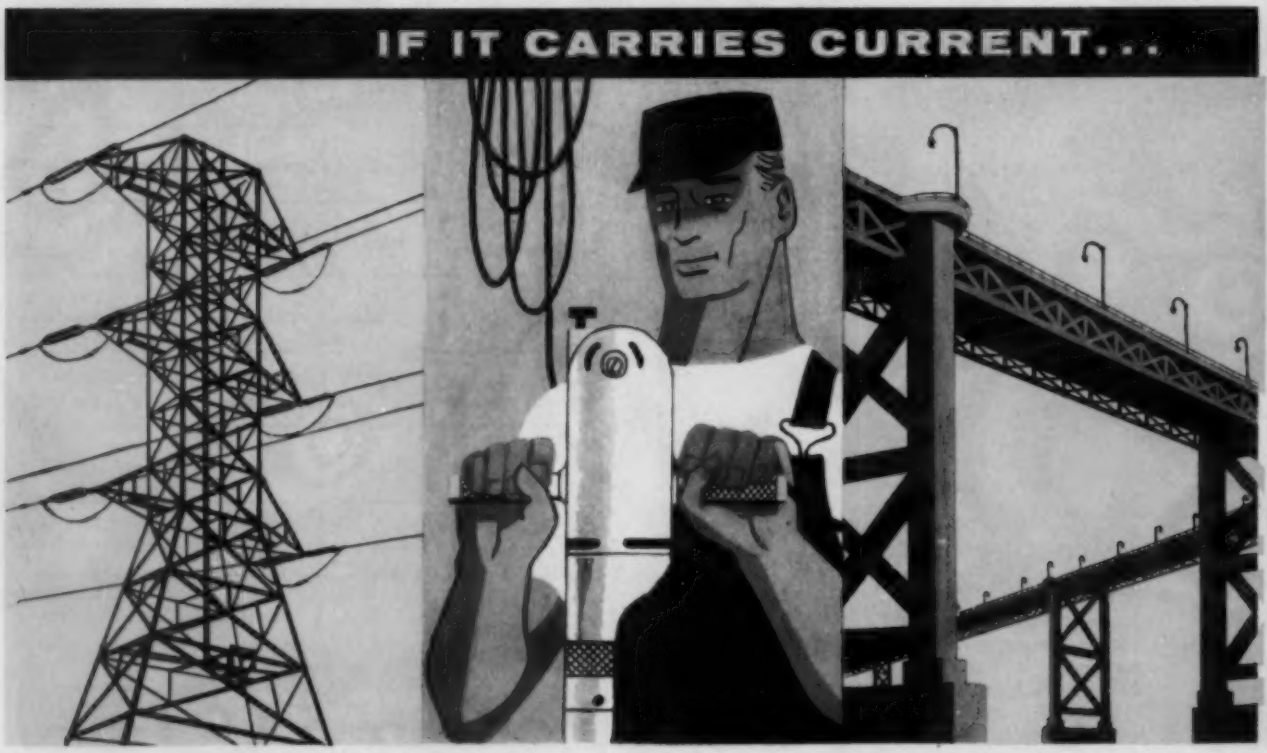
**A.** There will be no change in price structure as a result of the purchase. Kaiser Aluminum will continue to be a leader in maintaining a stable price structure throughout the market.

**Q. Can I now buy both aluminum and copper electrical conductor from Kaiser Aluminum?**

**A.** Yes—and in a wider variety than formerly available from either source. One of the primary effects of the purchase is to broaden the product range offered by Kaiser Aluminum in both aluminum and copper conductors.

**Q. How about the insulations used in U.S. Rubber products: will the quality still be the same?**

**A.** These high-quality insulations will remain exactly the same in every specification detail. In fact, they will be *supplied* by U.S. Rubber. Continued research cooperation will exist between the U.S. Rubber scientists and engineers and Kaiser Aluminum.



# your questions

## U. S. Rubber Wire and Cable Division

**Q. Will new people from both companies be calling on me?**

A. There will be no duplication of calls, because former U.S. Rubber personnel will be prepared to present the entire, broadened product line to those customers who can benefit by it. Occasionally, Kaiser Aluminum specialists will accompany the former U.S. Rubber representatives to help present the complete line. Conversely, Kaiser Aluminum Sales Representatives will be prepared to present the new, complete line to their established customers, assisted by former U.S. Rubber specialists.

**Q. I formerly bought through a Kaiser Aluminum or U.S. Rubber distributor outlet. How will this be changed?**

A. The distributor who formerly carried U.S. Rubber wire and cable will continue to offer the same products with no change. Present Kaiser Aluminum Distributor outlets also will remain unchanged.

**Q. Will there be any effect on the Field Engineering Services formerly available through either company?**

A. The technical assistance available to you will be greatly increased. Kaiser Aluminum—as the nation's largest producer of covered aluminum wire—is already a leader in research and product development, both in the laboratory and in the field. Now, by acquiring additional highly skilled technical personnel, these services will be further strengthened.

**Q. How will the new setup affect my delivery date?**

A. The convenience of a new eastern plant location, plus additional sales representatives and distributors, will mean even faster and more efficient service.

* * *

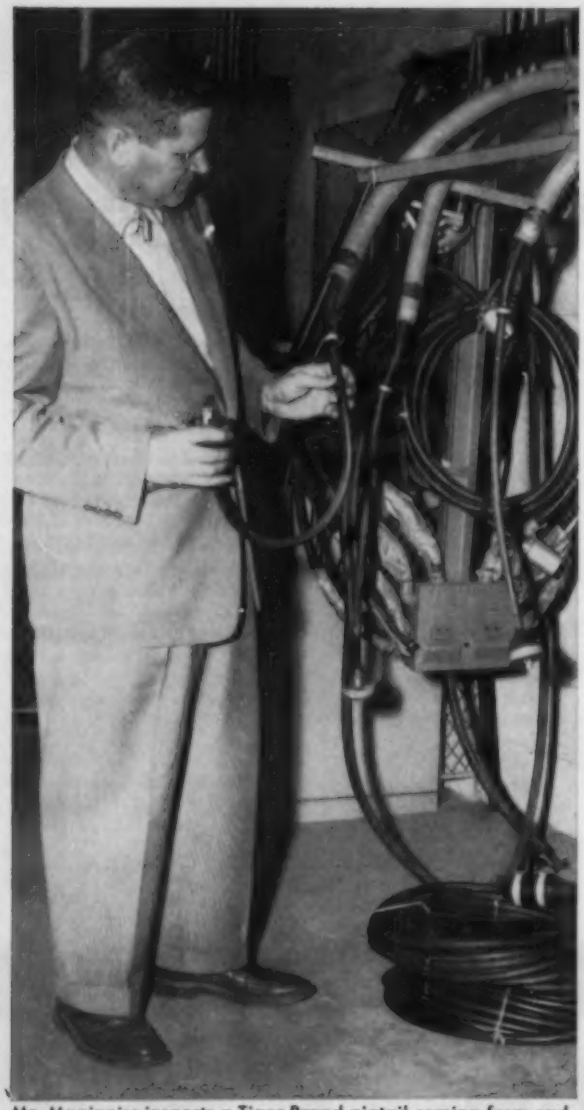
The purchase of the Wire and Cable Division of United States Rubber puts into operation the twenty-third plant for Kaiser Aluminum, which started with three plants just ten years ago.

This growth is based on the continued support of our customers, who, working with us, have helped to make Kaiser Aluminum the nation's fastest-growing major producer of aluminum. This latest acquisition represents another step forward in our program of complete service to the nation's rapidly-expanding electrical industry.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

**Kaiser Aluminum**

*See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.*



Mr. Maginniss inspects a Tiger Brand pigtail coming from end of a vibrator tool.

# "We've never had a complaint about Tiger Brand Amerclad!"

*says H. J. Maginniss, President*
*Maginniss Power Tool Company, Mansfield, Ohio*

Here's a success story for you. In 1947, Mr. Maginniss started his company with one employee—himself. One year later, he added one more employee. Today, he has 35, and business is booming. His only product is an electric generator-vibrator system that knocks the entrapped air out of freshly poured concrete so that it is denser and stronger.

Early in the game, Mr. Maginniss learned that construction men did not exactly baby his tools. As a result, everything is built as ruggedly as possible, and that includes the cable, which is four-conductor, No. 12 AWG Tiger Brand Amerclad. Sometimes the cable drapes over several stories of scaffolding and is dragged over rough concrete, wooden beams and steel piling—while heavy trucks roll over it down on the ground. Despite all this, they have never had a complaint about the cable.

Do *you* need this kind of quality? Your AS&W salesman will give it to you!

Harry Bunton points a vibrator. Notice heavy casing around cable near the hand hold.

Here is a cable casing that was damaged in use. Cable inside was not injured.

Workman ready to drop tool into concrete. Electric generator is on ground.

See the snarl of cable between tool and generator. Tiger Brand is made for this treatment.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

## USS TIGER BRAND ELECTRICAL WIRE & CABLE

*A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB*

- asbestos wire and cable
- mold cured portable cord
- shovel & dredge cable
- paper & lead cable
- varnished cambric cable
- interlocked armor cable
- special purpose wire & cable
- aerial, underground and submarine cable

USS

UNITED STATES STEEL

# Before you buy any giant-sized

# Measure TD-24 giant-sized

**With full-time "live" power on both tracks,** the TD-24 almost builds the road itself—hugging the mountain slope, giving added *operating ease, safety, and capacity!* That's another bonus from exclusive time-proven Planet-Power steering.

**When you're 'dozing through** rock and other materials, instant fingertip Hi-Lo shifting is a big cycle-speeder. And it cuts operator effort way down!

**Try holding a 19-ton load on the blade** with any other crawler this big—making a turn as this TD-24 is doing with both tracks pulling, while stockpiling coal with a special wing-type blade. The TD-24's operator can make "round-house," feathered, or pivot turns—with fingertip ease!

# tractor advantages!

**When you buy a big crawler** look beyond sheer size and weight. You may be paying for enough extra "iron" to cause a startling jump in fuel and upkeep costs. So compare. Weigh bigness against provable working and earning capacity! Measure these giant-sized TD-24 advantages that have proven out over 8 years of on-the-job success!

## Eliminates "dead-track drag!"

*Does the giant you're considering steer with full-time "live" power and "live" traction on both tracks?* TD-24 users by the thousands have proved that any crawler *this big* is obsolete without exclusive, time-proved Planet-Power steering advantages!

Planet-Power steering eliminates power-wasting, load-limiting "dead-track drag." Upgrade, downgrade, or on the level, you can smoothly turn a heavily-loaded TD-24—under positive control!

*Does the big one you're looking at give cycle-speeding on-the-go shifting?* The TD-24 does! And the exclusive two-speed planetary system teamed with a 4 speed synchromesh transmission —gives instant, stall-preventing and time-gaining Hi-Lo shifting, *without declutching.*

*Does that big one you need have the genuine in-seat, seconds-fast, all-weather International gasoline conversion starting?* Or the operating ease, power-transfer efficiency, and service-simplicity of the International Cerametallic-faced engine clutch? Or 8 practical speeds *forward and reverse?* Only the TD-24 has all these, plus dozens of other giant-sized advantages!

*Prove to yourself* the TD-24 beats all other giant-sized power – for *performance value* – for *big-scale ability to make you big money.* Ask your International Construction Equipment Distributor for a demonstration of a Gear-Drive or Torque-Converter TD-24!

**INTERNATIONAL® CONSTRUCTION EQUIPMENT**

**International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois**

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors ... Self-Propelled Scrapers and Bottom-Dumps ... Crawler and Rubber-Tired Loaders ... Off-Highway Trucks ... Diesel and Carbureted Engines ... Motor Trucks

**Heap-loading the sideboarded International "75"** Payscraper in less than a minute proves the economy and efficiency of the TD-24 as a "pusher."

# push your coal production UP

# with this hard-working JEFFREY team

### Jeffrey 70-UR Universal Cutter for bottom, top and shear cuts

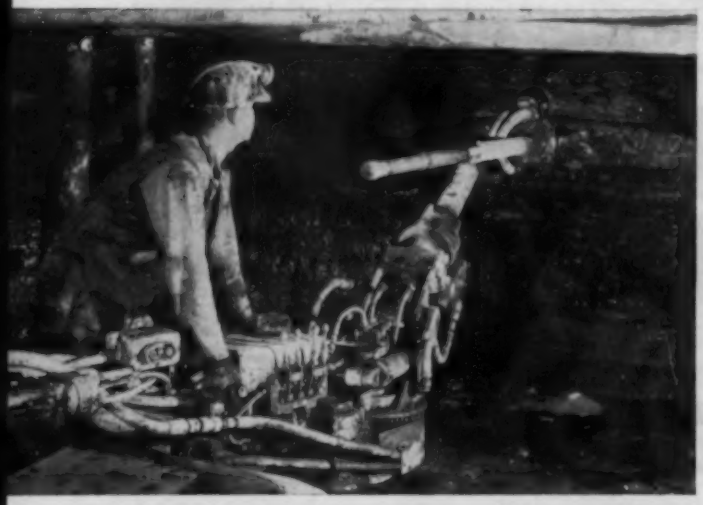
Head and cutter can be rotated 360° in either direction and positioned to make any kind of cut, any place in the seam. From one location, the 70-UR Cutter makes a 30-foot horizontal cut (using a 9-foot cutter bar) or a shearing cut 5'5" to either side of the machine's centerline. No wonder mine superintendents brag about its tonnage-producing ability!

**Operators** report smooth and positive traction for sumping, even when cutting at extreme range. The 70-UR's wide wheel gauge, long wheel base, low center of gravity and large pneumatic tires give sure-footed stability. Maintenance men say that its rugged construction reduces downtime and cuts upkeep costs.

## Jeffrey 81-A Loader for high capacity loading

From both a production and a maintenance standpoint, the 81-A Loader is a superior machine. It is well balanced and flexible, and is easily maneuvered; trams at 137 FPM and can be turned in its own length. The conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight and in break-throughs. It has a rated capacity of 8 TPM and a maximum capacity of 10 TPM.

Maintenance is simplified on the Jeffrey 81-A Loader because every motor and gear case is a separate, detachable unit. This kind of unit construction is used throughout, resulting in rapid replacements and lower upkeep costs.



## Jeffrey 56-FHR Face Drill for shot hole drilling

This single-boom drill provides a high degree of operating flexibility. It is rubber-tire-mounted and self-propelled by two hydraulic motors. Another operates the cable reel. The drilling head can be swung by finger-tip control to any desired position for shot hole placement. Drilling range is 7′ 2⅜″ vertically and 13′ 1¾″ horizontally.

## Jeffrey 56-RDR Roof Drill

Big, sturdy, easy to maneuver and fast drilling. 10′ 9½″ arm swing permits a wide room to be bolted from one position. Hydraulic torque wrench assures accurate bolt tightening.

**OTHER JEFFREY EQUIPMENT FOR UNDERGROUND SERVICE:**

Continuous Mining Machines • Conveyors • Shuttle Cars • Locomotives • Fans and Blowers
Descriptive literature sent upon request. The Jeffrey Manufacturing Co., Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

# Roebling Royal Blue Wire Rope will **bend** and **bend** and **bend!**

What's more, Roebling Royal Blue is *stronger* than the strongest wire rope previously available. It will do more work and last longer on *your* job. Call your distributor or your nearest Roebling office for full information about Royal Blue, the really better wire rope. John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

**ROEBLING**

*Distributors, Branches and Warehouses Throughout the Country—Subsidiary of The Colorado Fuel and Iron Corporation*

Valve on left is from compressor run for 3,000 hours with well-known, high-grade oil. At right is same valve after a 3,000-hour run with Sun Solnus oil. Note difference in carbon deposits.

# 3000-HOUR TEST PROVES SUN SOLNUS OILS REDUCE CARBON BUILD-UP IN COMPRESSORS

**Equipment:** A three-stage Norwalk horizontal-type compressor. Operating pressure: from 1,000 to 1,500 psi.

**Test:** The compressor was cleaned thoroughly and filled with a well-known, high-grade oil. The equipment was run for 3,000 hours, then torn down for inspection and cleaning. Then Solnus® 300 was tested in the same way.

**Results:** Look at the two pictures. You can see for yourself how Solnus oil reduced dangerous carbon build-up.

All types of reciprocating air compressors that have been changed over to a Sun Solnus oil show similar results. A test in your compressor will show the same remarkable reduction of carbon deposits.

You can get a technical bulletin about Sun Solnus oils by asking your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-52.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

**SUN OIL COMPANY** PHILADELPHIA 3, PA.

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IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

# DODGE *PowerGiants*

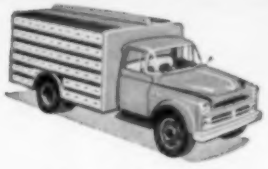
Dodge T700
Tandem

Dodge P300
Forward-Control

Dodge 600
with Van Body

Special bodies fit readily
on any Dodge chassis

Dodge 500
Stake



Dodge 400
with Beverage Body

## MOST *POWER* OF THE LOW-PRICED 3

Dodge T900
Tandem

Dodge 100
Panel

Dodge C.O.E. 700
Tractor

Dodge 800
Tractor

## In every weight class

Dodge Power Giants give you an extra bonus of power.

From 204-hp. pick-ups to 232-hp. tandems, Dodge V-8's outpower the "other two" by as much as 31%. This extra power reduces engine strain, saves wear. What's more, Dodge engines, both V-8's and 6's deliver full power on regular gas.

Dodge hauls more payload, too . . . up to one-third more. And Dodge offers major advantages in driving ease, cab comfort and prestige-building good looks. See for yourself. Your Dodge dealer has a Power Giant to meet every trucking need.

**DODGE TRUCKS** WITH THE *FORWARD* LOOK

*The trend is to Wheat...*

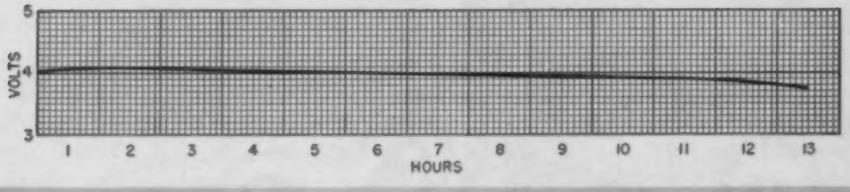
# the WHEAT FORTY-NINER

## Electric Cap Lamp

- Full Shift Performance
- Automatic Charging
- Minimum Maintenance

In the Wheat "Forty-Niner," the mining industry is offered an ideal combination of high-standard lighting and exceptionally low-cost maintenance. Wheat Electric Cap Lamps provide a very high percentage of initial illumination right through the full shift (see chart), and require no maintenance beyond ordinary cleanliness, weekly watering and occasional bulb replacement. Development of the Wheat Automatic Steel Charging Rack with its electronically-controlled, selenium-disc rectification makes possible further savings through fully automatic operation.

### Proof of Wheat Performance




See how the Wheat "Forty-Niner" maintains a high percentage of initial light efficiency right through the end of the shift! The chart clearly shows how the "Forty-Niner" maintains its light output at high levels during and beyond the entire working period. This is graphic proof of Wheat efficiency in battery design and construction.

Check these and other advantages of the Wheat "Forty-Niner" in the Wheat Bulletin. Write for your copy today!

National Mine Service Company

## National Mine Service Company

564 Alcoa Building • Pittsburgh 19, Pennsylvania

All-State Division, Logan, W. Va.
Anthracite Division, Forty Fort, Pa.
Ashland Division, Ashland, Ky.
Bemeco Division, Beckley, W. Va.
Kentucky-Virginia Division, Jenkins, Ky.
Western Kentucky Division, Madisonville, Ky.
Whiteman Division, Indiana, Pa. Morgantown, W. Va.

# Where Deadweight Is The Target They're Choosing Mayari R

A pound of deadweight saved can be a pound of payload gained, assuming overall strength is constant. That's one of the reasons why designers of vehicular bodies for railway, highway and mine are turning more and more to Mayari R high-strength, low-alloy steel.

Mayari R has a yield point much higher than that of carbon steel, which permits its use in lighter thickness without sacrificing strength. Because of this, payload capacity has frequently been upped as much as 20 pct, with attendant economies and profits.

But deadweight-vs-payload isn't the only reason for the growing use of Mayari R. Corrosion, for example, sometimes heads the list of important factors. Mayari R offers 5 to 6 times greater resistance to atmospheric corrosion than plain carbon steel. Weldability, too, is a criterion in some applications. Mayari R welds as readily as carbon steel, and with virtually the same procedures and equipment. It also stands up well under impact and has superior resistance to abrasion and battering.

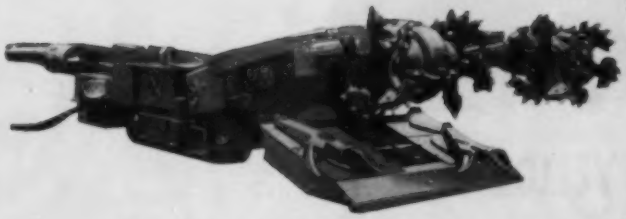
Our Catalog 353 contains technical details on Mayari R, plus scores of illustrated application stories. Designers and owners alike will find much of interest in this booklet, available through the nearest Bethlehem district office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**Mayari R**...High-Strength, Corrosion-Resisting Steel

BETHLEHEM STEEL

# ONLY THE Lee-Norse MINER gives you



## "PATTERN CUTTING"

The Lee-Norse Miner cuts a "DIAMOND PATTERN" in the face of the coal by simply revolving and oscillating the cutters at the same time. This is sometimes called "milling the coal off the face."

Every single Cutter Bit follows a right and a left spiral thread which produces the multiple criss-cross kerfs in the face of the coal. The diamond pattern is unique and very *important* because:

1. It cuts more coal with less power.
2. It produces coarse cuttings and less fines.
3. It is a simple and rugged mechanical device.
4. It instantly follows any variation in the thickness of the coal seam.
5. It is the ONLY REALLY NEW cutting tool introduced in recent years.

The Lee-Norse Miner is essentially a modern loading machine plus the most practical device for cutting coal. The Lee-Norse Miner loads all the coal from the floor with improved "dual" gathering arms and a flexible rear conveyor. Excellent clean-up . . . fast tramming.

## Lee-Norse Company

CHARLEROI, PA.

**DESIGNERS AND BUILDERS OF THE FAMOUS LEE-NORSE MINER, PORTAL BUS AND JITNEY**

**WHEREVER YOUR JOB TAKES YOU** *and whatever the nature of your contract, there's a Yellow Strand Distributor nearby. He's ready to expertly assist you in specifying the proper wire rope for your equipment. If you don't know his name, drop us a line!*

# Yellow Strand®

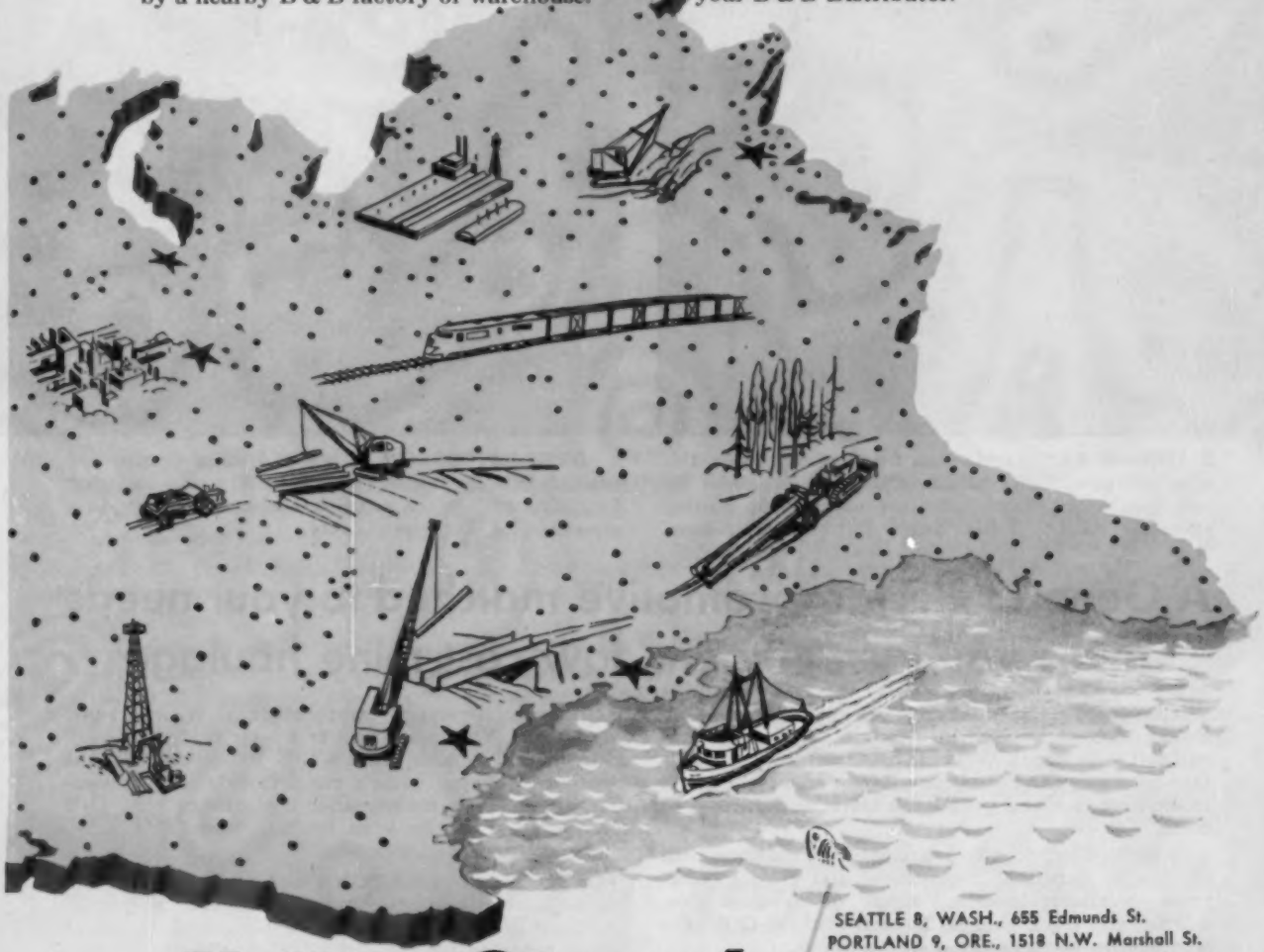
## . . . always on hand

Always nearby—always in ample supply—always top quality! That's why it pays to *specify* Yellow Strand Wire Rope for your equipment.

*Yellow Strand is always on hand* at your nearby Broderick and Bascom Distributor. He is probably the same man who takes care of your equipment, parts and service needs. He "knows" wire rope like an expert. He is served by a nearby B & B factory or warehouse.

This nationwide network of distributors, branches and factories is unique in the wire rope industry. It assures you the correct wire rope when you want it!

You can be *sure* of good performance when you use Yellow Strand "POWERSTEEL" and Yellow Strand Flattened Strand Wire Ropes —and *doubly* sure when they're backed by your B & B Distributor.



**Yellow Strand®**

**BRODERICK & BASCOM ROPE CO.**

*Manufacturers of Wire Rope for over 80 Years*

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PORTLAND 9, ORE., 1518 N.W. Marshall St.
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NEW ORLEANS, LA., 117 Jefferson Highway
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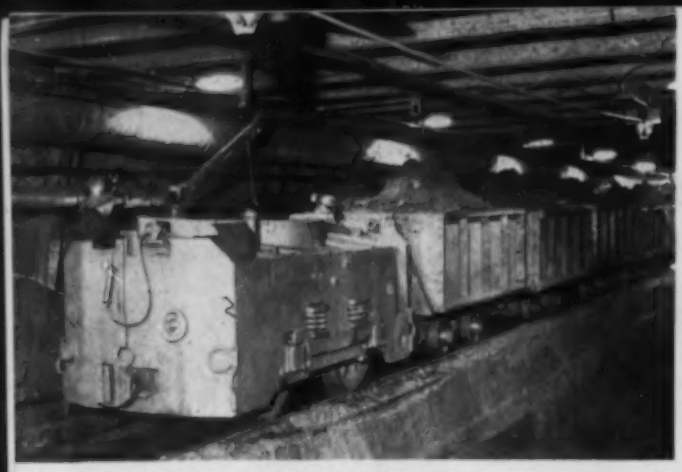
CHICAGO 7, ILL., 1330 W. Fulton St.
LOS ANGELES 21, CALIF., 2441 Hunter St.
HOUSTON 15, TEXAS, 9350 Market St. Road



**1. TROLLEY-CABLE REEL**—Built in 4-8 ton sizes, opened or sealed types, these versatile units can do gathering jobs quickly, economically. Centrally hung motors and equalized spring suspensions help prevent rail pounding, climbing.

**2. TROLLEY**—Fast, powerful, safer, and easy on the track, this heavy-duty haulage locomotive is available in eleven sizes, 4 to 40 tons, low height or standard. Requires little maintenance, is of sturdy, rugged construction.

**3. STORAGE BATTERY**—In sizes from 1½ to 10 tons, this type unit gives highly reliable, efficient, safer service for operations where trolley wires are not feasible. Battery eliminates stand-by losses, delays due to power failures.

**4. DIESEL-ELECTRIC**—G.E.'s powerful diesel-electrics are available in seven standard sizes, 25 to 80 tons . . . are ideal for surface haulage and switching operations. Electric drive gives them long life, dependability.

# A General Electric locomotive matched to your needs gives you fast, efficient, low cost mine haulage

Whatever your mine haulage or gathering requirements, there's a General Electric locomotive that will suit your needs. Whether for underground or surface haulage, a G-E straight-electric or diesel-electric locomotive can haul your loads faster and at reduced costs.

General Electric offers a complete standard line of sturdy, dependable industrial and mine locomotives—available in a full range of sizes, heights, widths, and track gauges. Typical of these G-E locomotives are the four types shown above.

G-E locomotives have proven their efficiency in thousands of mine and industrial applications under extremes of moisture, temperature, dust, and track conditions. You can expect this same efficient, highly reliable performance from a G-E locomotive that is matched to your mine's requirements. High availability and low maintenance costs mean that G-E locomotives can do your haulage jobs better . . . faster . . . more economically.

**FOR MORE INFORMATION** about G-E industrial and mine locomotives, or for a survey of your particular haulage needs—without cost or obligation—contact your nearest G-E Apparatus Sales Office. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 120-94

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

**Makes More Money.** Bryan Keith's versatile Skid-Shovel earns profits on other operations as well as the coal-stripping work, shown. It handles conservation jobs, land clearing, and basement digging. Mr. Keith says, "On basements, I can cut straighter walls ... back out of the hole with a full load where other loaders could only come out forward and half-loaded."

# "My TD-9 Skid-Shovel's PRY-ACTION BREAK-OUT doubles production"

—Bryan Keith, Manchester, Kentucky

"The pry-action break-out of my TD-9 Skid-Shovel practically doubles production over other equal-sized crawler loaders."

That's Bryan Keith, Manchester, Ky., reporting on the work power of his International Drott TD-9 Skid-Shovel.

Clearing brush, stripping 14 feet of 30% rock overburden and loading out coal—that's typical of the TD-9 Skid-Shovel's work schedule on which he bases his remarks. His TD-9 Skid-Shovel strips 50 cu yd of overburden per hour. It loads unshot coal direct from the seam.

Pry-action break-out ranges from 12,200 lbs on the International ... TD-6 Four-In-One or Skid-Shovel —to 26,000 lbs on the TD-18 model. For special applications like land clearing, the TD-18 model can be equipped with larger hydraulic cylinders to develop

What about dependability and long life?

"The exclusive skid-shoes, and Hydro-Spring design save wear on the crawler, insure comfort and safety for the operator," says Mr. Keith. "Operation is economical and the outfit is easy to maintain."

**See how an International Drott** Skid-Shovel does jobs other rigs can't do—with triple-power pry-action break-out teamed with bucket-heaping, ground-level roll-back. Compare how exclusive shock-swallowing Hydro-Spring protects equipment and operator. Ask your International Construction Equipment Distributor for a Four-In-One or Skid-Shovel demonstration.

Here's Mr. Keith's TD-9 Skid-Shovel semi-skidding a load of "spoil" upgrade—making use of the exclusive big skid-shoes.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL®
DROTT®

# a NEW screen...for NEW profits

## in coal sizing...

**Here's New proof you get MORE...MORE VALUE when you specify A-C! Every feature of the new Model "S" screen has been carefully calculated to give you outstanding performance at lowest possible cost...**

1. **Added screen cloth life** provided by close spacing of clamping bar bolts and by proper camber of deck.

2. **Rigid side plates** reinforced by vertical angles.

3. **Sturdy screen deck frame** features heavy channels, diagonal braces, replaceable cross members.

4. **No metal-to-metal contact.** Full-length rubber buffer strips cushion screen cloth.

5. **Screen surface easy to install** — Surface slides into place over full-length hook supports. Self-locating clamping bar assembly accommodates screen surface of any thickness.

6. **All parts replaceable.** All bolted construction, using locknuts.

7. **Feed box** (optional) absorbs impact of incoming material. Provides uniform distribution when equipped with flow control gate.

8. **Back plate** (standard) **prevents spillage** — adds structural strength.

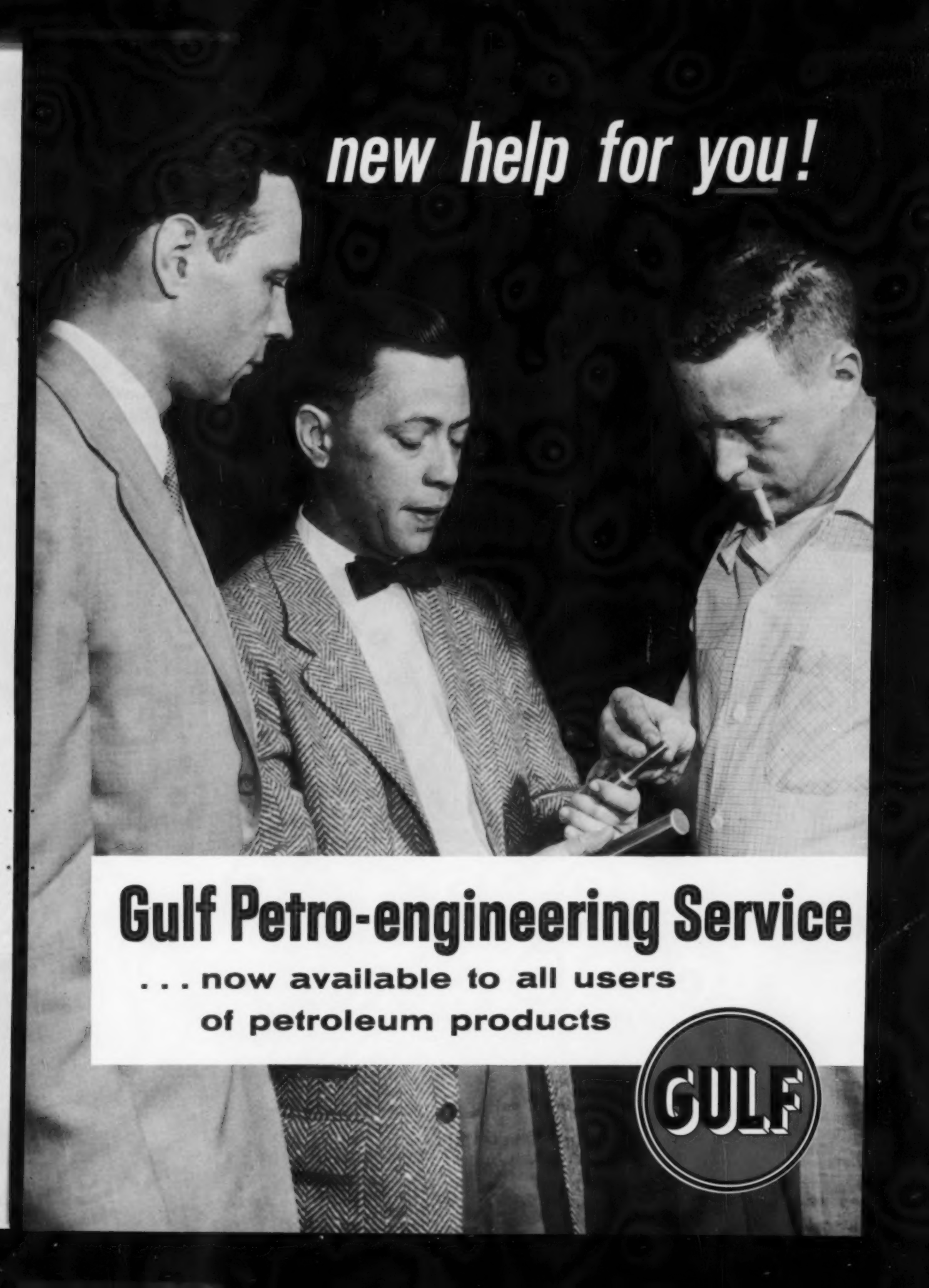
9. **Springs prevent whipping and breaking** of screen cloth by maintaining proper tension.

10. **Simplified mechanism** assures maintenance economy.

For complete information, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin 07B8229.

# ALLIS-CHALMERS

A-4990


new help for you!
Gulf Petro-engineering Service
. . . now available to all users
of petroleum products
GULF

Proper engine tune-up procedures mean maximum fuel economy in fleet operations. Gulf Sales Engineers work closely with fleet maintenance superintendents to help save fuel, lengthen periods between overhauls, and increase availability of equipment.

# Gulf Petro

## brings you practical involving the use of

Gulf Sales Engineers can provide practical assistance to paper mill operators on any process or problem that involves petroleum products.

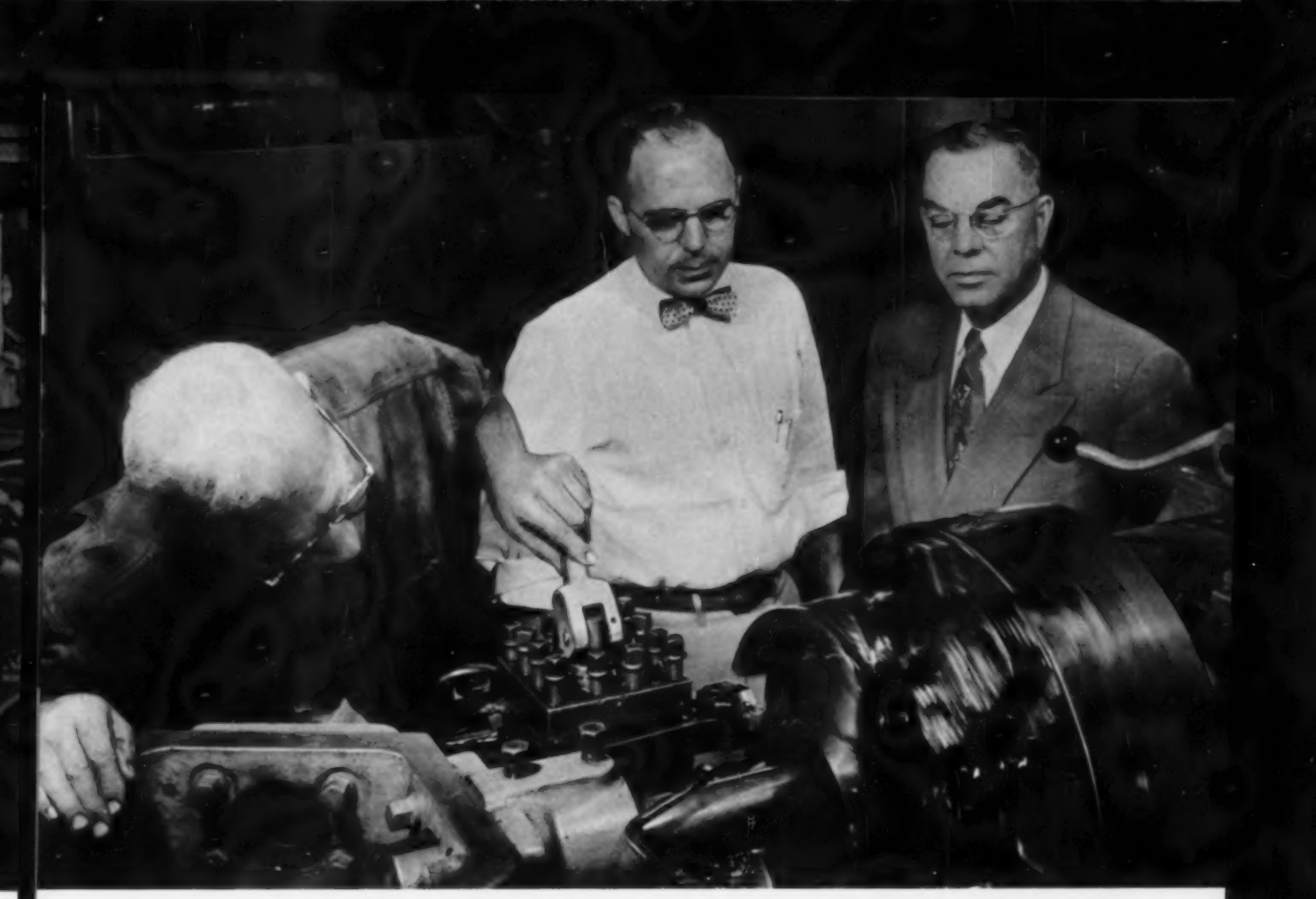
If you are engaged in manufacturing, mining or quarrying . . . construction or transportation . . . communication or public utility service—you can profit from Gulf Petro-engineering Service.

All of these fields use petroleum products. Many problems arise in connection with their use—problems of proper selection, of storage, of dispensing, of application schedules. And, most important of all, problems of equipment performance!

Very few companies, however, find it practical to hire or train qualified people to perform this specialized engineering job. Gulf offers you its own trained staff to assist you with these problems.

Gulf Petro-engineering Service puts a petroleum specialist in your plant or other base of operations to give you impartial, expert advice on any problem in any way related to the uses of petroleum products.

You can get Gulf Petro-engineering Service if you are



A Gulf Petro-engineering Service specialist can help you select the most suitable cutting fluid for each machining operation. Chances are he will find practical ways to improve production, increase tool life and lower costs.

# -engineering Service

## help on every problem and process petroleum products

a user of petroleum products—whether or not you have been buying those products from Gulf.

There is no charge for this service.

In essence, here's what Gulf Petro-engineering Service offers you . . .

1. Expert help with any immediate problem involving use of *any* petroleum product.
2. Practical help on any long-range problem, including those which may involve new uses or new types of petroleum products.
3. A survey of your entire operation. Aim: to help you achieve greater efficiency and economy in the use of fuels, lubricants, cutting oils, rust preventives and process oils.

Gulf has a large group of trained and experienced sales engineers ready to serve you. The typical Gulf Sales Engineer who contacts you is a graduate engineer. He has been well-schooled in the formulation and uses of petroleum products. He has the versatility and invaluable knowledge that comes through many years of practical field experience.

If yours is a highly involved or difficult problem, he can enlist the help of another specialist—a Gulf Product Application Engineer.

Behind Gulf field representatives are more than 1,300 scientists, engineers, metallurgists and chemists at Gulf laboratories specializing in the manufacture and application of petroleum products. Their knowledge, coupled with the experience of field engineers, adds up to a broader, better service than has ever been offered before to industrial and commercial users of petroleum products.

Take advantage of Gulf's Petro-engineering Service now. Use the coupon on the next page to send for booklet describing the complete service—or write or call your nearest Gulf office.

# Gulf Petro-engineering Service

## can be put to work for you immediately on any or all of these problems. It can help you . . .

- Plan the installation of more efficient fuel and lubricant storage and dispensing facilities.
- Get maximum fuel economy through proper engine tune-up procedures.
- Obtain maximum heat or power from each gallon of fuel oil through more efficient combustion.
- Establish proper oil change periods.
- Cut maintenance costs through improved application of lubricants.
- Select rust preventives according to the exact kinds of protection you need.
- Eliminate or reduce oil vapors, sludge deposits and corrosion of fuel oil storage tanks.
- Reduce the number and variety of lubricants used.
- Establish proper flushing procedures for both old and new equipment.
- Control dust on plant grounds and parking lots.

*If you are faced with any of these common problems—or with any problems involving petroleum products in use—simply call your nearest Gulf District Office.*

GULF OIL CORPORATION
Gulf Building, Pittsburgh 30, Pa.

☐ Send free Gulf Petro-engineering Service booklet.
☐ Have a Gulf Sales Engineer call.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

GULF

**GULF OIL CORPORATION**
Pittsburgh 30, Pa.

SF-8934

# Simple rear-dump construction pays off

Construction of the Tournapull Rear-Dump has been radically simplified from that of a conventional heavy-duty hauler. In place of a foundation frame and body sub-frame, Tournapull Rear-Dump hitches rear and front wheels through a horizontal yoke extending back from the kingpin and pivoted to the body itself just above and ahead of the rear wheels. Body is simpler, much stronger . . . has no frame and sub-frame to get out of line.

Look at the photo above . . . note the absence of springs, spring hangars, and tie rods. Low-pressure tires adequately absorb the shocks of rough haul-road travel and high-speed loading. Eliminated are spring maintenance, replacement time and cost of spring parts.

Front wheel drive and kingpin-type steering help simplify Tournapull construction, too. No longer must power be carried back to the rear through a drive-shaft. Bearing and lubricating problems of a long drive-shaft are eliminated. No longer is steering handled by small front wheels subject to misalignment. There are no tie rods, no hinged steering connections to become twisted or bent.

Nor do you have the troubles of hydraulic hoists or gravity dumping with these Rear-Dumps. Dump is by an electric winch that lifts the body up on twin cables. Operation is under complete control at all times, with positive power for dump and return controlled by an electric switch on the dash. There are no oil seals, no high-pressure lines and jacks to keep tight, no freezing up in cold weather as with hydraulics. There are no shock loads as in gravity dumping. You save on regular maintenance time because there is no hoist mechanism to check . . . only a few places to lubricate.

Let us show you how these savings can put money in *your* pocket. For proof, we'll be glad to show you performance figures from a job like yours, or, if you wish, give you names and addresses of owners of Tournapull Rear-Dumps, so you can check for yourself. Call soon.

**Tournapull Rear-Dumps Come in Sizes to Fit Your Needs**

| "D" | "C" | "B" | "A" |
|---|---|---|---|
| 9 tons | 22 tons | 35 tons | 50 tons |
| 138 hp | 208 hp | 293 hp | 420 hp |

Prime-movers also power interchangeable scrapers, bottom-dumps, flat-beds, and cranes.

Tournapull—Trademark Reg. U.S. Pat. Off. R-774-G-b

**LeTourneau-WESTINGHOUSE Company,** PEORIA, ILLINOIS

*A Subsidiary of Westinghouse Air Brake Company*

**WHERE QUALITY IS A HABIT**

# *Heavy-duty switch stand for today's haulageways*

This is the Bethlehem Model 1222 switch stand. It was designed especially for use with heavy rails weighing 65 lb and over. The illustration shows the Model 1222 at work in a brand-new track layout designed by Bethlehem and built with 85-lb rail.

Although the 1222 is muscular and tough, it is unusually compact. In fact, it has the amazingly low overall height of 4¼ in., making it ideal for confined locations. You can even install it between switch points if conditions are that crowded.

This stand works on the sliding-block principle, which develops powerful leverage and makes the stand easy to throw. There are only three moving parts: the lever, the crank and the sliding block. None of these parts is located below the base of the stand; thus the mechanism stands clear of ballast and roadbed.

The Model 1222 can be used in connection with a standard rigid rod, or with Bethlehem's No. 11 SFU spring rod, as shown above. It can be furnished with special crank to carry standard target lamp or target only. A Bethlehem engineer will be glad to explain this stand in detail at your convenience.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**BETHLEHEM STEEL**

BETHLEHEM STEEL

# GENERAL NYGEN® TIRES

...built tougher for the toughest jobs!

**Featuring Stronger-than-Steel NYGEN® CORD**

Designed to make every off-the-road job show a profit, big, rugged General Truck Tires are built to take brutal punishment . . . built to out-perform any other tire on any project. Unexcelled for strength with *exclusive* Nygen Cord construction and delivering dependable tractor-like flotation and traction, Generals provide the ultimate in job-hazard protection. Their job performance records prove Generals best!

***specify GENERALS on your new equipment***

THE GENERAL TRUCK TIRE

**THE GENERAL TIRE & RUBBER CO. • Akron, Ohio**

# MODERN HEAVY-DUTY CAT* FOR EVERY JOB

**From a quarter century of diesel leadership, now comes the world's most advanced line of diesel engines.**

Developed by Caterpillar research, these compact units pack more power in less space and deliver greater efficiency, greater economy and longer life in any application.

You have your choice of hundreds of variations in engines up to 650 HP (maximum output capacity), electric sets up to 350 KW (continuous duty) and marine engines up to 500 HP (continuous duty). They're available as original or replacement power for excavators, hoists, crushers, electric power, pumps, boats, loggers, sawmills and other equipment.

### Why they do a better job than ever

These modern heavy-duty diesels feature the four-cycle design which provides a smooth, effective power stroke and a more efficient utilization of power. They require practically no attention. Their fuel system requires no adjusting. And Caterpillar's single-orifice fuel injection valves with the precombustion chambers permit the use of such low-cost fuels as No. 2 furnace oil without fouling. All these and other features add up to new standards of performance in diesel power.

### A quarter century of diesel leadership

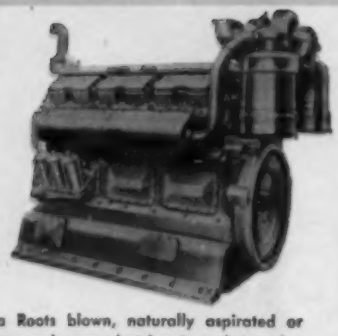
For modern power that stems from a quarter century of diesel leadership, specify Caterpillar units. Leading manufacturers can supply them in the equipment they build.

For complete information about them, see your Caterpillar Dealer. He backs you with prompt service. He has the experience and technical knowledge to help you with your power problems.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

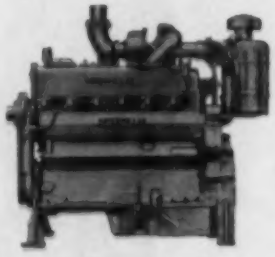
**HUNDREDS OF DIFFERENT UNITS TO MEET YOUR POWER NEEDS**

**D397**
with
Turbocharger
**650 HP†**



Also available as a Roots blown, naturally aspirated or spark-ignition engine — and as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

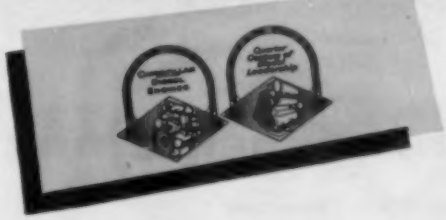
**D337**
with
Turbocharger
**310 HP†**



Also available as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

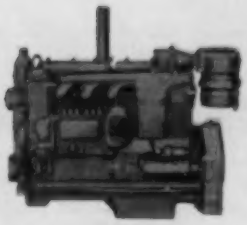
**CATERPILLAR***

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

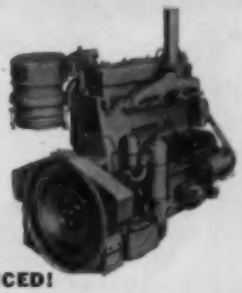


# DIESELS

**NEW**
**D318**
**(Series G)**
Turbocharged
**175 HP†**



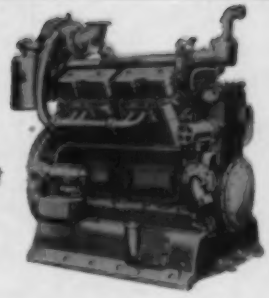
**NEW**
**D315**
**(Series G)**
Turbocharged
**115 HP†**



**SMALLER, LIGHTER AND LOWER PRICED!**

Keeping in line with Caterpillar's continued diesel leadership are these new Series G engines. They are designed for use in installations where space is at a premium. Both are small, light and low-priced; yet they deliver dependable power with the renowned Caterpillar durability. They are available naturally aspirated (above) or turbocharged. Choice of air or electric starting system.

**D375**
with Turbocharger
**430 HP†**



Also available as a Roots blown, naturally aspirated or spark-ignition engine — and as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

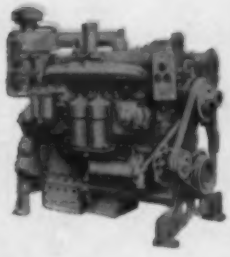
**D342**
Naturally Aspirated
**210 HP†**

Also available as an electric set or marine engine. Choice of air, electric or gasoline starting system.

**D339**
Naturally Aspirated
**140 HP†**

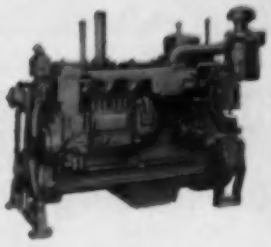
Choice of air, electric or gasoline starting system.

**D326**
Naturally Aspirated
**200 HP†**



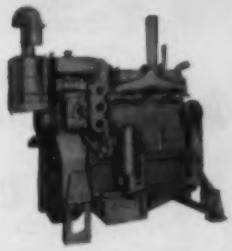
Also available as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

**D318**
Naturally Aspirated
**137 HP†**



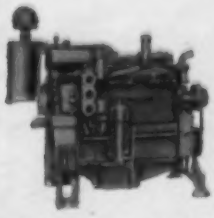
Also available as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

**D315**
Naturally Aspirated
**91 HP†**

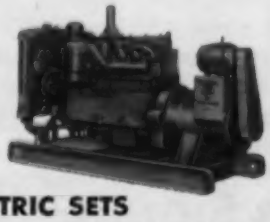


Also available as an electric set, marine engine or torque converter power unit. Choice of air, electric or gasoline starting system.

**D311**
Naturally Aspirated
**65 HP†**

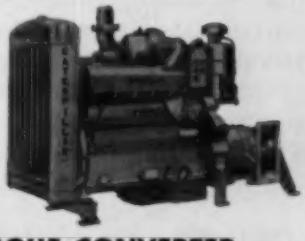


Also available as an electric set. Choice of air, electric or gasoline starting system.



## ELECTRIC SETS

Dependable electric power, featuring the new Cat Generator, is available in standard voltages, 60-cycle, in the following KW sizes: 30, 40, 60, 100, 150, 165, 200, 225, 250, 315, 350. Also available as 50-cycle and DC units. The new generator brings you the best features of self-regulated and externally-regulated generators in one compact package.

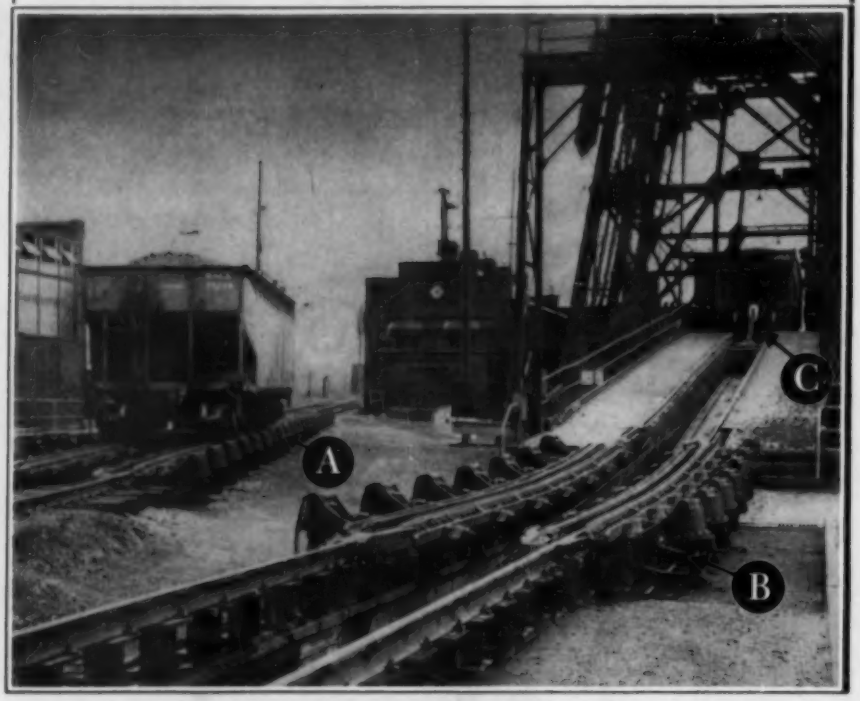


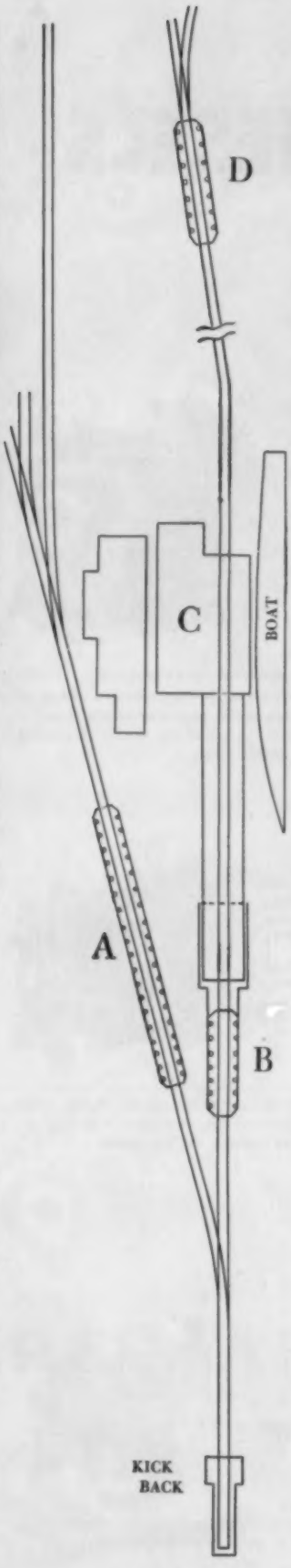
## TORQUE CONVERTER POWER UNITS

Many different arrangements are available for each of six Caterpillar Engines to provide you with a greater selection of power packages. You have a wide choice of power units and a wide choice of output shafts.

*†maximum output capacity*

**FAST AND EFFICIENT MATERIALS HANDLING**—Loaded coal car rolls down the incline on the left at about 15 miles per hour. Its speed is reduced automatically in car retarder (A) so that it rolls up a "kick back" at just the right speed to send it back to retarder (B) where it is stopped automatically. A "barney" then pushes the car up the slope to the car dumper (C) where coal is unloaded directly into the ship. The next full car pushes the empty car off the dumper. It rolls down through retarder (D) to the proper track. All this is done by push-button control.




# Automation with UNION CAR RETARDERS cuts costs on coal-loading dock

Forty carloads of coal an hour can be loaded on shipboard with this coal-handling system at a Lake Erie coal dock at Conneaut, Ohio.

This job formerly required a crew of men riding the cars and working the hand brakes—a hazardous occupation. Insurance rates were high and frequently men had to wait for the next ship to be loaded.

Now the work is handled quickly and safely by a push-button system using UNION Electro-Pneumatic Car Retarders. Costs have been greatly reduced and hazards eliminated.

If you have a materials-handling situation involving many carloads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for complete information.

**UNION SWITCH & SIGNAL**
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
SWISSVALE, PENNSYLVANIA
NEW YORK.....CHICAGO.....PITTSBURGH.....ST. LOUIS.....SAN FRANCISCO

# Okocord Red Saddle shuttle car cable is the answer to:

## constant flexing • run-overs • abrasion pulling • twisting

Conditions in individual mines vary. But you can be sure that you have a shuttle car cable that will resist all of these difficulties if yours is Okocord Red Saddle shuttle car cable (with Hex-Tite construction, of course).

The Red Saddle is a pre-formed neoprene protective wall which assures a uniformly thick fill between conductors . . . gives added security against short-circuiting during run-overs.

What's more, there's no danger of internal slipping or rotation with Hex-Tite construction. For the insulation of each conductor is hexagonally shaped to provide six plane surfaces which lock with the Red Saddle and Okoprene sheath. Bonding between all elements is assured by a special adhesive.

Naturally, the Okoprene sheath is tough, highly flexible and is unaffected by oils, acids, alkalies and mine water.

These features—plus others such as the heavy reinforcing cords embedded in both insulation and sheath as a further guard against pulling damage—are all good reasons why we believe Okocord Red Saddle, using the Hex-Tite construction, is your best buy in shuttle car cable.

You'll find complete information about this rugged construction in Bulletin CA-450. Write today for your copy to The Okonite Company, Passaic, N. J.

4774

*where there's electrical power... there's* **OKONITE CABLE**

# Loaded and ready for profitable blasting

## PRIMACORD®
## DETONATING FUSE

This hole could be one in a thousand, ready to "go" when *you're* ready to go — but not before. It is primed with Primacord, the detonating fuse which is resistant to sparks, friction, ordinary shock, stray electrical currents . . . . Even a direct hit by lightning failed to detonate it!

But a single detonator, attached to the end of the trunk line, will detonate this hole and all other holes in the hook-up. You'll get a blast you'll be proud of!

**THE ENSIGN-BICKFORD COMPANY**
**Simsbury, Connecticut • Since 1836**
*Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®, Quarrycord, Pyrotechnical Devices and Blasting Accessories.*

The square knot is used only above ground, to lengthen a trunk line of Plain or Reinforced Primacord or to tie in Primacord M S Connectors. It must be drawn up tight.

**Plain Primacord Trunk Line** — Used also for shallow holes — wherever resistance to abrasion and cutting is not required. Textile covered, flexible, resilient, with a "tacky," non-slip surface. Tensile strength 140 lbs. 1000-ft. spool weighs 17 lbs.

**Reinforced Primacord Branch Line** — recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 170 lbs. 1000-ft. spool weighs 18 lbs. The knot shown is the double-wrap half hitch, made in the branch line and drawn tightly around the trunk line.

P-4

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

MARCH, 1957

IVAN A. GIVEN, EDITOR

# Essential Men

THE FACTS on a situation that already is giving some coal companies a headache—and may eventually evolve into an industry-wide problem unless remedial steps are taken—are presented for the first time in this issue of *Coal Age*. See "Coal's Engineer Shortage," by Maurice Cooper, director, mining engineering education, National Coal Association. To get these facts, Mr. Cooper surveyed the anthracite and bituminous industries to determine the engineers now employed and also what both industries now need. Anthracite, as might be expected, has no pressing need for more engineers at the moment, but the bituminous industry is significantly understaffed.

The money that is necessary for mining today is in itself reason for all the engineering talent possible, since the greater the investment the greater the need for insuring that it produces as it should. It detracts nothing from the importance of operating management to point out the obvious fact that the engineer can help all the way along the line. Good reason, therefore, for taking to heart Mr. Cooper's suggestions for recruiting, training and on-the-job development. Otherwise coal will have to struggle with a significant handicap for all-too-many years to come.

# Universal Key

BITUMINOUS MINING involves, among other things, contending with millions of cubic feet of flammable gas, rather than only a few, and with millions of tons of potentially explosive material, rather than a few ounces or pounds. The industry has learned to live fairly well with this condition, but has not reached perfection yet. Otherwise, explosions, such as the one at Bishop Feb. 4, claiming 37 lives, would be a thing of the past instead of a still-present hazard.

The Bishop disaster is a reminder that attaining and maintaining safety is an everlasting job. It should spark the renewed and intensified effort on which further progress will depend—and get the bituminous industry in particular out of the stalemate of the past year or so. The good that comes with the bad is evidence that further progress is perfectly possible—the good in this instance being the Wheelwright record, set out elsewhere in this issue, in fighting off the major coal-mine killer: roof falls. The key was full acceptance of responsibility and active participation and cooperation by all. Completely extended to the entire coal mining industry, it would automatically cut injuries and fatalities to the irreducible minimum.

# Accelerated Drive

FERMENT is perhaps the best word for the mine-to-transportation situation today in coal. The boiling up of ocean freights is being paralleled by attempts to get enough shipping capacity to bring them back to reasonable maximums. In the United States, the campaign of the railroads for higher tariffs is putting pressure on the development of alternate forms of transportation. More and more coal companies are making a break for water. Those that can't make it to water will be intensely interested in other methods of reducing freight costs.

Meanwhile, the tactics of the railroads in the recent series of rate-increase requests have taken on some of the aspects of confusion, if not chaos. But it is a foregone conclusion that when the dust settles the rates will be up again. The fact that it is philosophically possible to agree that the railroads must make money to continue to run will not alter the fact that the coal industry's job will be made harder, and that increases will accelerate the drive to get away from rails.

# Coal's Engineer Shortage . . .

**At least 250 more engineers are needed now to bring bituminous staffs up to desired levels. Additional men will be required as the industry grows in the future. Recruiting must be stepped up and steps taken to make employment as attractive and rewarding as possible.**

# How Big Is It? What Needs to Be Done

By M. D. COOPER
Director, Mining Engineering Education,
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THE BITUMINOUS COAL INDUSTRY today is apparently at least 10% understaffed in its engineering department. This is the conclusion that must be drawn from a recent survey of engineering employment and needs made by the Mining Engineering Education Division of the National Coal Association. Anthracite, on the other hand, presents a picture of full staffs, as well as a considerably higher number of engineers per million tons of production—nearly seven compared to slightly over three for bituminous.

Participating producers reported as follows:

| | |
|---|---|
| **Anthracite** | |
| Number company groups | 15 |
| Approximate percent industry output | 55 |
| Number engineers now employed | 96 |
| Number needed | 0 |
| **Bituminous** | |
| Number company groups | 173 |
| Approximate percent industry output | 50 |
| Number engineers now employed | 867 |
| Number needed | 115 |

The goal in this survey was to ascertain the number of men actually working as engineers in mining and directly related activities. Men with operating responsibilities, even though graduates or at one time engineers, were specifically excluded. Extrapolating from the actual totals reported, with weighting as necessary, it can be concluded that anthracite is employing close to 200 engineers and has no outstanding need for more, while bituminous is employing around 1,700 to 1,800 engineers and needs over 250 more.

The available engineering talent, of course, is not limited to men actually employed, since the majority of the small companies, and some larger ones, employ outside engineers and consultants, and so report.

## TALENT BREAKDOWN

The types and numbers of engineers presently employed by the anthracite and bituminous producers reporting are shown in accompanying tables. As might be expected, the mining engineer leads the list in numbers, while it may be assumed that mining is the principal or sole responsibility of most of the chief, division, resident, field and colliery engineers and their assistants. Electrical, preparation and mechanical engineers are the next most numerous groups. Construction, safety and many other titles are those traditionally found in the industry.

In "new" categories, the survey shows that the industrial engineer has already moved into a position of prominence and influence in the coal industry—primarily in the past 5 yr. Employment intentions indicate that industrial engineers will be hired in increasing numbers in the future.

The reason for the rise in the number and importance of the industrial engineer is not far to seek. Offsetting the rises in the cost of both equipment and manpower requires that both produce at maximum efficiency. This is the particular goal of industrial engineering, and its practitioners, are specifically trained in both principles and practices. As a result they almost always achieve a cost reduction, and in many instances the reduction is as much as 20% or more, according to reports from companies with comprehensive industrial engineering programs.

Though not yet impressive from the standpoint of numbers, the presence of more maintenance, and construction, engineers on the roll is evidence of another significant trend in coal mining. This reflects the increased emphasis on maintenance resulting from greater use of more complex, higher-capacity and higher-cost machines. As a result of this change in emphasis, the man with mechanical or electrical training and maintenance responsibilities may find more and more in the future that his title includes the word "maintenance."

## BITUMINOUS NEEDS

Anthracite, as previously noted, has been able to maintain its engineering staffs at desired strength and therefore is not in the market for more than normal replacements at the present time. Bituminous, however, as also noted, presents a radically different picture of 10% understaffing.

The number of engineers 173 bituminous producing groups, accounting for half the 1955 output, say they would employ is shown in an accompanying table. The specific requirements of these 173 groups total 115. In addition, a number of those replying said that they could use "more engineers," "several engineers" and so on without being exact as to type or number. Consequently, it may be concluded that the bituminous industry could make good use of as many as 250 engineers now.

Mining engineers and engineers with primarily mining responsibilities are the ones most in need. Industrial engineers are second in terms of need, followed by electrical, mechanical, preparation and plant. The maintenance engineer's growing importance also is shown by the relatively higher number listed as needed.

## SHORTAGE EFFECTS

Many mining companies responding to the survey, perhaps because they have not had to go into the market recently or have been fortunate in finding men easily, would concur in the question asked by one: "Engineer shortage—real or imaginary?" Typical of the comments by those who have not had a problem—yet—or who have been fortunate are: getting engineers although they often fail to measure up to the standard we set for them."

"One engineer to be hired because of expansion. Currently interviewing applicants. Anticipate no difficulty in filling job."

Those with troubles, however—and the response to the survey shows that there is a significant number in this category—are bothered not only because they are having difficulty filling engineering positions but also because they are short of the type of men they would like to train for supervisory and managerial jobs. Some of their comments are:

"Need electrical, mechanical and preparation engineers. Good mainte-

## Bituminous Engineering Employment by Reporting Company Groups, NCA Survey

Groups Classified According to 1955 Output

| Type of Engineer | DEEP MINES—146 GROUPS | | | | | | STRIP MINES—27 GROUPS | | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under 100,000 | 100,000-500,000 | 500,000-1,000,000 | 1,000,000-2,000,000 | Over 2,000,000 | Total | Under 100,000 | 100,000-500,000 | 500,000-1,000,000 | 1,000,000-2,000,000 | Over 2,000,000 | Total | |
| Mining | 19 | 43 | 50 | 36 | 140 | 288 | .. | 6 | .. | 10 | 18 | 34 | 322 |
| Chief Mining | .. | .. | .. | .. | 3 | 3 | .. | .. | .. | .. | .. | .. | 3 |
| Asst. Mining | .. | .. | .. | 3 | .. | 3 | .. | .. | .. | .. | 2 | 2 | 5 |
| Electrical | 2 | 14 | 10 | 5 | 46 | 77 | .. | 1 | 1 | 9 | 5 | 16 | 93 |
| Chief | 9 | 17 | 12 | 13 | 28 | 79 | .. | 2 | 1 | 7 | 5 | 15 | 94 |
| Asst. Chief | .. | .. | .. | 1 | 1 | 2 | .. | .. | .. | 1 | 1 | 2 | 4 |
| Preparation | 3 | 7 | 16 | 7 | 49 | 82 | .. | 3 | .. | 4 | 3 | 10 | 92 |
| Mechanical | 5 | 9 | 6 | 3 | 37 | 60 | .. | 2 | .. | 5 | 4 | 11 | 71 |
| Industrial | .. | .. | 2 | 5 | 44 | 51 | .. | .. | .. | .. | .. | .. | 51 |
| Chief Industrial | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Jr. Industrial | .. | .. | 2 | .. | .. | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Time-Study | .. | .. | .. | .. | 3 | 3 | .. | .. | .. | 1 | .. | 1 | 4 |
| Production | .. | .. | 2 | .. | 1 | 3 | .. | .. | .. | 1 | .. | 1 | 4 |
| Division | .. | 3 | .. | 3 | 34 | 40 | .. | .. | .. | 6 | .. | 6 | 46 |
| Chief Division | .. | .. | .. | .. | 5 | 5 | .. | .. | .. | .. | .. | .. | 5 |
| Construction | .. | .. | .. | .. | 11 | 11 | .. | .. | .. | 1 | .. | 1 | 12 |
| Maintenance & Construction | .. | .. | .. | .. | 5 | 5 | .. | .. | .. | .. | .. | .. | 5 |
| Civil | .. | .. | .. | .. | 4 | 4 | .. | .. | .. | 8 | .. | 8 | 12 |
| Resident | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | 5 | 5 | 6 |
| Asst. Resident | .. | .. | .. | .. | 4 | 4 | .. | .. | .. | .. | .. | .. | 4 |
| Field | .. | .. | .. | .. | 3 | 3 | .. | .. | .. | .. | .. | .. | 3 |
| Safety | .. | .. | .. | .. | 5 | 5 | .. | .. | .. | 1 | .. | 1 | 6 |
| Chief Safety | .. | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Design | .. | .. | .. | 2 | 3 | 5 | .. | .. | .. | .. | .. | .. | 5 |
| Property | .. | .. | .. | .. | 2 | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Plant | .. | .. | .. | .. | 2 | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Apprentice | .. | .. | .. | 2 | .. | 2 | .. | .. | .. | .. | .. | .. | 2 |
| Junior | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Ventilation | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Mining Practices | .. | .. | .. | 1 | .. | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Chemical | .. | .. | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Geological | .. | .. | .. | .. | 1 | 1 | .. | .. | .. | .. | .. | .. | 1 |
| Drilling & Shooting | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 |
| Lands | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 |
| Prospect | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 |
| Office | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 |
| TOTAL | 38 | 93 | 101 | 84 | 434 | 750 | .. | 14 | 2 | 55 | 46 | 117 | 867 |

## Anthracite Engineering Employment by Reporting Groups, NCA Survey

Groups Classified According to 1955 Output

| Type of Engineer | Under 100,000 | 100,000-500,000 | 500,000-1,000,000 | 1,000,000-2,000,000 | Over 2,000,000 | Total |
|---|---|---|---|---|---|---|
| Mining | 2 | 3 | .. | 41 | 1 | 47 |
| Mechanical | 1 | .. | .. | 5 | 8 | 14 |
| Division | .. | .. | .. | 4 | 5 | 9 |
| Electrical | 1 | .. | .. | 4 | 3 | 8 |
| Chief | .. | .. | 1 | 2 | 4 | 7 |
| Preparation | 1 | .. | .. | .. | 2 | 3 |
| Colliery | .. | .. | .. | .. | 2 | 2 |
| Special | .. | .. | .. | .. | 2 | 2 |
| Safety | .. | .. | .. | 1 | .. | 1 |
| Blasting | .. | .. | 1 | .. | .. | 1 |
| Field | .. | .. | 1 | .. | .. | 1 |
| Project | .. | .. | 1 | .. | .. | 1 |
| TOTAL | 5 | 3 | 4 | 57 | 27 | 96 |

nance men are not available in our area."

"Need mining engineers to put in as section foremen and bring up in our organization. Could use 15 to 20 this way."

"The shortage of engineers has not materially affected our operations but we have supervisory positions open now that we would like to fill with men of engineering training."

"Shortage prevents employment of graduates as trainees for supervisory positions. Would add engineers to be trained as supervisors."

"Would put more engineers to work if they would accept production training."

"We would like to employ six graduates – three mining engineers, three industrial engineers–per year for training program."

"No shortage now but last engineer we hired was difficult to find."

"We have been trying for the last 6 mo to secure a mining engineer for general mine work looking to a successor to our mining chief when he retires but have been unable to find the proper man."

In addition to the previous and other comments, a question as to the effects of an engineer shortage brought out the following:

"Openings available at headquarters for another mining and electrical engineer. Also, we can use 6 to 8 mining graduates in our plant-engineering setup. Shortage of engineers will eliminate or delay certain engineering studies, and will result in incompleteness in certain others."

"We have a large number of unfilled engineering positions. We have no depth in these positions and are trying to obtain trainees from 1957 graduating classes. Our operations will suffer in efficiency and modernization without these positions. We are eager to add good engineers. The problem of recruitment is most severe for us since . . . we must induce graduates to leave metropolitan areas. Yet, we cannot pay much more than the going rate. Jobs needing engineers are: industrial engineering inspectors, division mining engineers and maintenance and construction departments."

"Been necessary to hire outside engineering. We need at least three assistant mining engineers, recent graduates preferred."

## Engineering Needs of Reporting Bituminous Groups, NCA Survey

Groups Classified According to 1955 Output

DEEP MINES

| Type of Engineer | Under 100,000 | 100,000-500,000 | 500,000-1,000,000 | 1,000,000-2,000,000 | Over 2,000,000 | Total |
|---|---|---|---|---|---|---|
| Mining | 1 | 1 | 2 | 24 | 10 | 38 |
| Asst. Mining | .. | .. | .. | 1 | .. | 1 |
| Chief Mining | .. | .. | 1 | .. | .. | 1 |
| Asst. to Chief | .. | .. | .. | 1 | .. | 1 |
| Division Mining | .. | .. | .. | .. | 1 | 1 |
| Industrial | .. | 1 | .. | 4 | 8 | 13 |
| Jr. Industrial | .. | .. | 3 | .. | .. | 3 |
| Ind. Engr. Analyst | .. | .. | 1 | .. | .. | 1 |
| Ind. Engr. Inspector | .. | .. | .. | .. | 1 | 1 |
| Operations | .. | .. | .. | .. | 1 | 1 |
| Time-Study | .. | .. | 2 | .. | 3 | 5 |
| Electrical | .. | 1 | 1 | 2 | 5 | 9 |
| Mechanical | .. | 1 | 1 | .. | 6 | 8 |
| Plant | .. | .. | .. | .. | 8 | 8 |
| Not Specified | .. | 2 | .. | 4 | .. | 6 |
| Maintenance | .. | .. | .. | .. | 5 | 5 |
| Preparation | .. | 1 | .. | 2 | .. | 3 |
| Chief Preparation | .. | 1 | 1 | .. | .. | 2 |
| Construction | .. | .. | .. | .. | 1 | 1 |
| TOTAL | 1 | 8 | 12 | 38 | 49 | 108 |

STRIP MINES

| | | | | | | |
|---|---|---|---|---|---|---|
| Asst. Mining | .. | .. | .. | .. | 3 | 3 |
| Mining | .. | 1 | .. | 1 | .. | 2 |
| Preparation | .. | .. | .. | 1 | .. | 1 |
| Not Specified | .. | .. | .. | .. | 1 | 1 |
| TOTAL | .. | 1 | .. | 2 | 4 | 7 |
| GRAND TOTAL | 1 | 9 | 12 | 40 | 53 | 115 |

### THE JOB AHEAD

The results of this survey of engineering employment and needs are concrete evidence that coal mining is suffering an engineering shortage of real magnitude. The further conclusion is that the coal industry must step up its efforts to secure engineering talent. It is not only necessary to make up the present deficiency but the trend in mining clearly indicates that many more engineers will be required in the future. This trend reflects not only the expected increase in production in the years to come but also the further evolution of machines and machine methods.

The steps that coal should take to solve its engineering manpower problem include the following:

1. Check salary policy to make certain that rates are adequate to insure the necessary flow of talent into the industry.

2. Check operating policy and practices to make sure that the talents of engineering recruits are used to the fullest, whether in engineering proper or in preparation for operating positions.

3. Lend a hand in interesting high-school graduates in taking up mining engineering. Some of the possible ways include the following:

A. Visit with graduating classes to point out the opportunities in the coal-mining industry. As a corollary, give students and teachers an opportunity to visit mines.

B. Financial help through scholarships to outstanding students or sons of mining employees. The number of scholarships being offered is growing, and several companies already are asking those who accept their scholarships to come to the company on graduation for at least a year or two years. One company, for example, reports that it has 16 boys in engineering schools and is depending on them for future staffing. A second reports that "Prospects for unfilled engineering positions are now in school and are expected to return on completion of school work." The scholarship is probably the most important of all methods of securing an adequate pool of graduates.

4. Provide summer work for engineering students and prospects.

5. See that engineering trainees have the opportunity to take jobs when they graduate.

Perhaps coal has not yet reached the crisis stage in engineering employment but there is no question but that it is now in a period of difficulty. Early action means an earlier solution to the problem of technical manpower for the future growth period.

# Pittsburgh-Seam Pillaring With Continuous Miners

By MARTIN VALERI,
Assistant Superintendent
Buckeye Coal Co., Nemacolin, Pa.

THE FIRST CONTINUOUS MINING MACHINE (Joy 4-JCM) at Nemacolin was placed in operation in April, 1949. Originally, this miner was placed on development, driving four entries to establish a new secondary haulage road. After two years of development work it was decided to experiment with the miner on retreat work. Different methods of full extraction were tried, such as open ending with a fender, splitting the block with a 50-ft center, and variations of these systems. A modification of the open end system, leaving stumps instead of a fender, was found to be the most satisfactory.

The second continuous miner (Joy 1-CM) was placed in operation in January, 1955. Both miners are kept on retreat work mainly because of their success in controlling the immediate roof. From 8 to 10 in of top coal are left by the miners to prevent air slacking of the drawslate. In addition, this top coal, which will float at the washing gravity, has a very high ash and sulfur content, and when mined, seriously affects the quality of the clean coal product.

The roof support problem is to control the various layers of immediate roof which consist of 8-10 in top coal, 1-2 ft of soft friable drawslate, and intermittent layers of wild coal and shale which vary from 1 to 6 ft. In retreat work the top coal and drawslate come down with the cut in the conventional sections, but are held in place 80% of the time in the continuous miner sections.

Sink and float tests were run on some continuous miner coal, with and without drawslate coming down. The results of these tests are shown in the accompanying tables.

It is evident that by holding the top coal the cleaning plant can wash at a higher gravity, resulting in an increase in yield with little change in sulfur and ash content. When too much top coal is put through the washer the gravity must be lowered to produce an acceptable product. With a drop in gravity there is a subsequent loss of good coal in the refuse. These lost tonnages, while sometimes small, have a noticeable effect on the cost per ton.

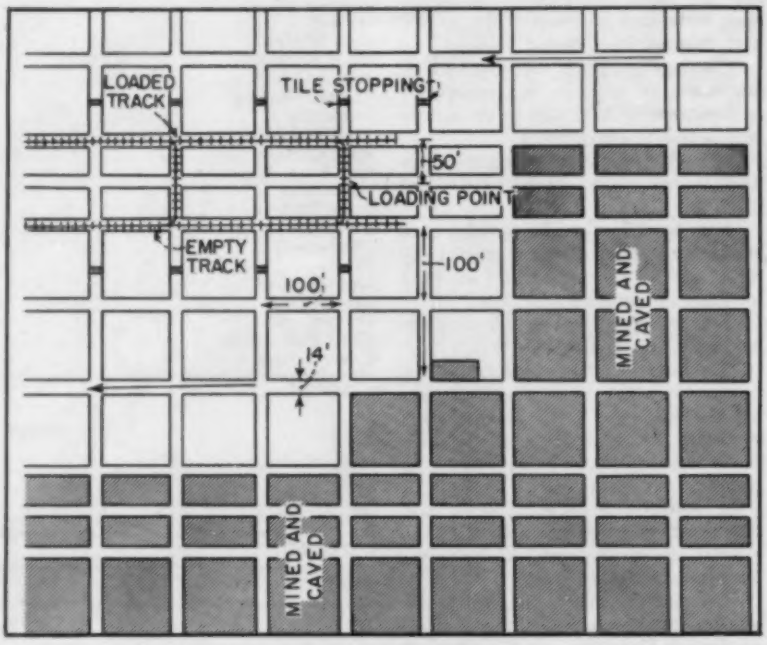



FIG. 1—TYPICAL SECTION consists of four headings with block between center headings split to provide access to loading points.

## Raw Coal with 1½ ft of Drawslate Loaded

(4 x ⅝-in Slotted)

| | Weight, Percent | Ash, Percent | Sulfur, Percent |
|---|---|---|---|
| Float, 1.45 Sp Gr | 64.9 | 8.52 | 1.79 |
| Sink, 1.45 Sp Gr | 35.1 | 78.84 | 3.74 |
| | 100.0 | | |

## Raw Coal with Drawslate Held to Roof

(4 x ⅝-in Slotted)

| | Weight, Percent | Ash, Percent | Sulfur, Percent |
|---|---|---|---|
| Float, 1.45 Sp Gr | 88.2 | 6.92 | 1.65 |
| Sink, 1.45 Sp Gr | 11.8 | 54.16 | 8.90 |
| | 100.0 | | |
| Float, 1.47 Sp Gr | 88.8 | 6.98 | 1.66 |

## NEMACOLIN MINING SYSTEM

The mine is being worked on a block system with 14-ft entries and crosscuts on 100-ft centers. This leaves blocks of 86x86 ft to be pillared, which is an ideal size for conventional units. Since the continuous miners are used in conjunction with conventional units, the same size block must be mined by both types of equipment. From the experience gained at Nemacolin, a more desirable length of lift for a continuous miner, in the absence of special conditions, would be 75 ft or less. Future plans call for separating the miners from the conventional units and experimenting with a smaller sized block.

Fig. 1 shows a typical section. It

From a presentation made by the author at the December, 1956, meeting of the Coal Mining Institute of America, Pittsburgh, Pa.

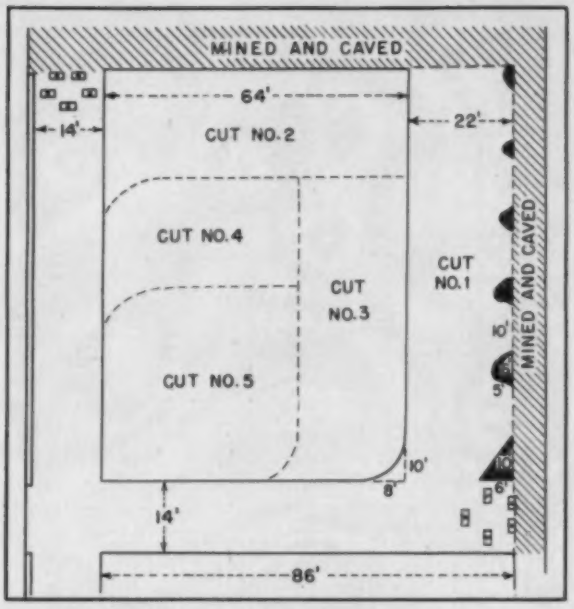



**FIG. 2—BOTH CONTINUOUS MINERS** at Nemacolin use this open-end method of extracting 86x86-ft blocks of coal.

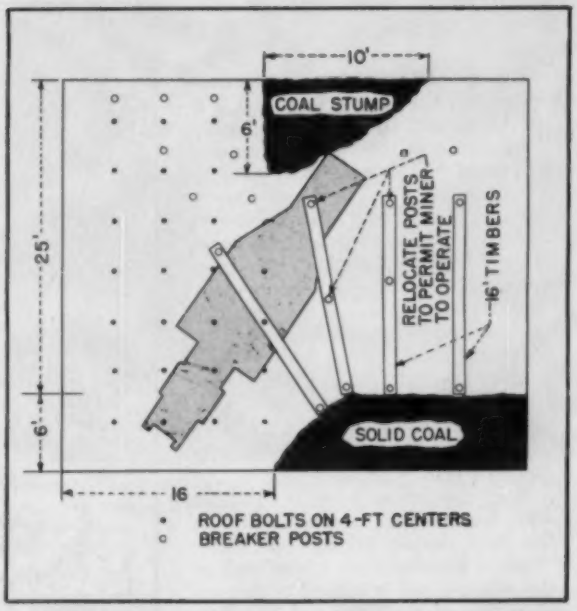



**FIG. 3—ROOF BOLTS,** timbers and breaker posts are used to provide protection and to insure desired roof breaks.

consists of four headings turned off at right angles to the main entries and developed a distance of 1,800 ft. Entry No. 1 is for the intake air, entries Nos. 2 and 3 are for track haulage, and entry No. 4 is for the return air. The block between No. 2 and No. 3 headings is split parallel to No. 2 and No. 3 as the section is developed, and loading points are spotted at 200-ft intervals in this split block. A loop system of track (40-lb rail) furnishes a continuous flow of empties to the loading point, and enables the loads to be gathered without interfering with the loading cycle.

## RECOVERING PILLARS

When the section is developed to its limit of 1,800 ft the pillaring of the blocks is begun. The blocks between entries No. 1 and No. 2 (next to solid coal) are left intact to allow a flow of air into the section and will be pillared when the succeeding section retreats. Therefore, the blocks to be extracted are the ones between No. 2 and No. 3, between No. 3 and No. 4, between No. 4 and No. 1, and between No. 1 and No. 2 of the preceding section, giving a total of four blocks.

The Joy 1-CM miner is retreated on a modified 45-deg rib line. Two of the blocks are removed on a 45-deg line while the remaining two are taken out flat, or at right angles to the entry. Carrying a relatively flat rib line reduces the haulage distance from the miner to the loading point, resulting in a minimum car change time.

Two shuttle cars are used to haul the coal from the miner to the loading point. One miner uses a surge car and one shuttle car traveling to the loading point. An 11 BU loader has been used with success behind the 4-JCM. This is not standard practice due to the risks involved in pillar or retreat work, especially when the lifts are going through.

Fig. 2 shows a detailed plan of extracting the block with a modification of the full open-end system. This method is used by both miners. Preparations for taking a lift include the setting of breaker posts along the open end to provide protection for the operator and the machine and to get the desired roof break.

Cut 1, or first lift, is started 30 ft from the corner of the block, usually in the cross-cut which is on the butt cleavage plane, leaving a front stump 6 ft wide against the gob. When the miner has advanced into the block 10 ft, a window is punched through into the gob. This leaves a triangular front stump approximately 6 ft wide and 10 ft long. The width of the lift at this stage is 22 ft from the gob to the solid rib. A second triangular stump, 5x6 ft is left as the machine advances. This procedure is repeated as the lift is being removed, with each succeeding stump being smaller and the intervals between them greater.

The minimum timbering plan requires cross bars placed not more than 5 ft apart. Hydraulic jacks on the miner are used to elevate the timber against the roof and hold it there while steel jacks are set. The steel jacks are set in far enough from the ends of the cross bar to permit later installation of wooden posts, replacing jacks. Where the roof is tender, posts are placed under the cross bar before the miner is permitted to sump in.

Just as the lift is being finished, or pushed through, a square stump approximately 5x5 ft is left on the corner to protect the place until it is cut through to the gob. The two front stumps are removed as the miner retreats out of the place. Two to four posts are set under the timbers adjacent to the stumps to be weakened, then one leg is removed from under the timber on the gob side to provide clearance for the continuous miner to reach the stump. The accompanying illustration, Fig. 3, shows this plan.

Cut 2 is taken out in a similar manner but from the entry heading, or on the face cleavage plane, and is 64 ft in length, compared to 86 ft for cut No. 1. While cut No. 2 is being extracted, a fall is being made in cut 1. Cut 3 is then taken out from the cross cut and like cut 2 is 64 ft in length. Cut 4 is started from the entry heading and is 42 ft in length. Cut 5 can be taken out from either the cross cut or entry, depending upon the operating conditions at that time.

The pillars are open-ended with only stumps against the gob to insure good roof breaks and relief of pressure on the pillars. Trouble with bottom heaving can result if excessive roof pressure is permitted to develop on the pillars.

## VENTILATION AND POWER

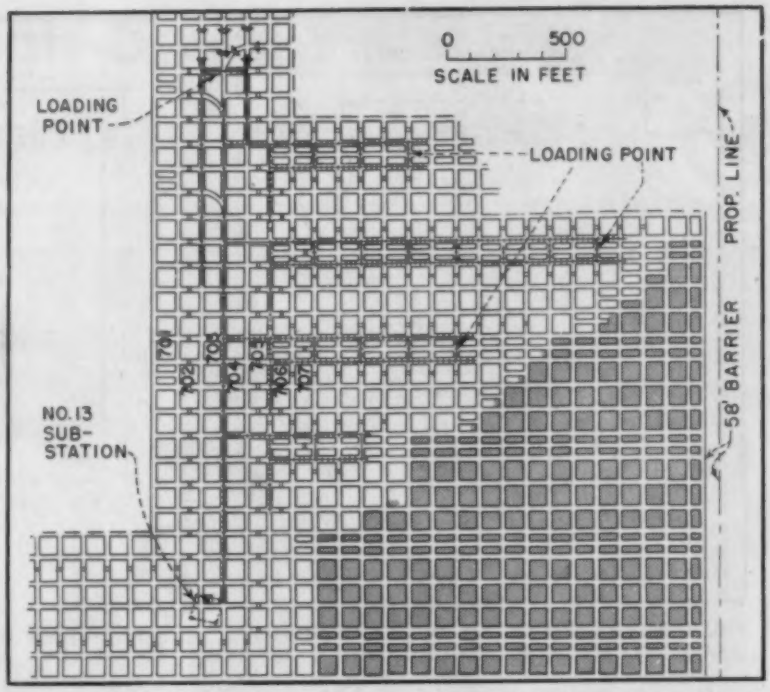
The mine is ventilated on the exhaust system by three fans. The fan ventilating the area in which the contionuous miners are located is a 9 ft fan producing 400,000 cfm. Section ventilation practice varies with the method of mining employed, but usually the intake air flows over the entry adjacent to solid coal and returns over and along the worked out portion of the section. In pillaring with the continuous miner, the practice is usually to make the air return around the gob side of the pillar being mined. This is accomplished by installing tight checks between the place being worked and the section return. As a result, a high volume of air passing over the equipment toward the gobbed area is possible.

Each continuous miner is equipped with four nozzles to spray water on the face during mining operations. Water is supplied from a head tank on the surface, and is carried to the sections through 6-in, 4-in and 2-in pipe. A small pump which develops a pressure of from 350 to 400 psi delivers the water to the miner through a 2-in pipe and a 1-in rubber hose.

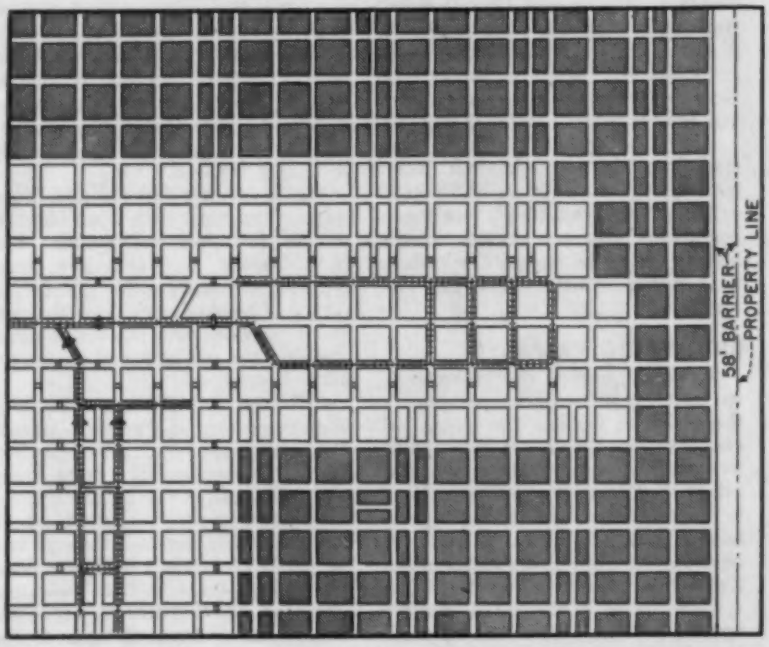
For efficient miner operation, 270 v, DC, should be maintained at the junction box. To provide this power, the surface sub-station is equipped with three 300-kw motor-generator sets. Three positive and three negative cables, 1,000-MCM capacity per cable, are carried from the substation through boreholes to the underground power system. The power is distributed underground along the main headings by means of two 1,000-MCM positive cables paralleled by 6/0 trolley wire. The return is furnished by a 1,000-MCM cable in parallel with 70-lb bonded track. In the continuous miner section the power is supplied through 1,000-MCM cable in parallel with the 6/0 trolley wire and is returned by way of a 1,000-MCM negative cable paralleled with the 40-lb bonded track in the section. This gives an average voltage of 250 at the machine under an average current load of 550 amp.

## CREWS AND PRODUCTIVITY

The operating crew on the Joy 1-CM consists of eight men on the first shift and six men on the second shift. The first-shift crew consists of an operator, two shuttle-car operators, two timbermen, one mechanic, and two front men. The second-shift crew is the same except for the two front men. At the present time approximately 65% of the total mine production is from retreat work. Of the total coal mined on retreat, the two miners account for 25%. This ratio is expected to change as more continuous miner units are employed.




**PANEL LAYOUT** includes loop-haulage system to eliminate car-change delays at loading points. Adequate ventilation and power are important.




**FINAL EXTRACTION** recovers main-entry pillars. As shown here, typical sections have been recovered on both sides of main entry.

Section productivity varies as different operating conditions are encountered, but a more consistent tonnage is obtained by the continuous miner units. Production figures for 1956 show that the tons per man of the continuous miner crews is 55% greater than the tons per man of the conventional retreat crews. Although there are only two continuous miners in operation they have made a substantial contribution to increased efficiency and lower costs at Nemacolin mine.

**WIDE RANGE OF ANTHRACITE SIZES** is cleaned in hydraulic-powered heavy-media vessel. Drain-and-rinse vibrating screen (right) provides means for recovering magnetite. Studies show magnetite loss to be 0.32 lb per ton of clean coal.

# Gravity Flow in Cleaning Coal

**The benefits:**

**Reduced maintenance**

**Lower power consumption**

**Minimum manpower**

**Maximum yield from feed**

FULL GRAVITY FLOW in all normal circuits inside the plant and the use of special materials to reduce maintenance costs are two features of the new anthracite cleaning plant operated by Blaschak Coal Co., Mahanoy City, Pa., in which a heavy-medium vessel, a Hydrotator and three wet tables are employed to produce clean coal in all sizes from stove through No. 5. The only lift requiring an elevating conveyor is in recirculating crushed stove coal at the clean-coal shakers. An auxiliary crushing circuit has been installed at this point to increase the production of smaller sizes when market demands dictate the need for such an increase. Special materials applications include the use of stainless steel liners in chutes to improve the flow of solids and reduce maintenance and the use of aluminum pipe in several water and slurry lines. Stainless steel also is used in screen cloth on the primary sizing shakers for the barley, No. 4 and No. 5 decks.

Anthony Blaschak manages the operation which includes a deep mine producing most of the 70-tph feed for the plant. A minor portion of the feed is supplied from nearby deep operations. The plant offers truck-loading facilities and a 45-ft truck scale.

Facilities for two-stage crushing and hand-picking have been installed in a separate structure to eliminate excessive vibration at the top of the main plant structure. This also reduces the total height of the plant and consequently leads to a more economical structure.

## CLEANING THE COAL

Deep-mined raw coal is trucked from the mine to a 200-ton hopper at the plant. Two vibrating feeders remove coal from the hopper and discharge to a bull shaker which drops out the stove and smaller sizes. Overproduct of the bull shaker passes over a picking table and is discharged into double-roll Wilmot crusher to be reduced to minus 3¼ in. A screening feeder under the primary crusher drops out the minus 2⅞ in material (stove and smaller) and the overproduct of the feeder is passed through a second stage of crushing with rolls set to produce minus 2⅞. The underproduct of the screening feeder, the product of the secondary crusher and the stove-and-smaller from the bull shaker are loaded

**COMPACT** anthracite plant is designed for low maintenance, reduced power consumption and minimum labor.

**SPECIAL MATERIALS APPLICATIONS** include the use of aluminum pipe (arrow) in this line which transports No. 5 coal to ground-storage stockpile.

**FRONT-END LOADER,** equipped with 4-yd coal bucket, loads raw coal into feed hopper, recovers ground-stored No. 5, cleans access roads to the plant.

onto a Barber-Greene elevating belt conveyor to be raised to the top of the cleaning circuit in the main plant. The belt conveyor feeds onto a 4-deck primary sizing shaker which provides the size fractions to be distributed to the cleaning units. A combination of buckwheat, pea, nut and stove is chuted from the top deck into the Wilmot OCC vessel. Rice coal from the second deck is chuted to one of the three Deister SuperDuty Diagonal-Deck tables; barley is chuted to the 2 -ft Hydrotator, and No. 4 coal to a second table. Water and solids passing through the primary sizing shaker are collected in a settling tank from which a drag conveyor raises the solids to be cleaned as No. 5 coal on the third table.

It has been noted by the plant operators that a middlings product is produced on the rice table which can be collected and returned to the primary shaker to increase total plant yield. This material is conducted from the table through an aluminum pipe into a storage bin. Then about once each month the stored middlings are circulated again through the complete cleaning circuit.

Clean coal and sink material from the heavy-media unit is discharged onto a 3x16-ft single-deck partitioned vibrating screen, where the recovery of magnetite, as explained later, begins. The clean coal is chuted onto a 6-deck final-sizing shaker for separation of the stove, nut, pea, buckwheat, rice and barley sizes. Underflow of the final shaker is sluiced into the settling tank from which the feed for the No. 5 table-coal is taken.

## Heavy-Media Performance at 1.80 Sp Gr

**FEED**

| Mesh | Weight, Percent | Cumulative Weight, Percent | Ash, Percent | Cumulative Ash, Percent |
|---|---|---|---|---|
| 1⅝ in stove | 28.5 | 28.5 | 28.9 | 28.9 |
| 13/16 in nut | 28.0 | 56.5 | 24.7 | 26.9 |
| ⅝ in pea | 11.6 | 68.1 | 22.0 | 26.1 |
| 5/16 in buck | 17.4 | 85.5 | 21.6 | 25.2 |
| ⅜ in rice | 9.7 | 95.2 | 21.3 | 24.7 |
| −⅜ in Undersize and smaller | 4.8 | 100.0 | 20.4 | 24.4 |
| | 100.0 | | | |

| Sp Gr | Weight, Percent | Cumulative Weight, Percent | Ash, Percent | Cumulative Ash, Percent |
|---|---|---|---|---|
| 1.80 | 74.0 | 74.0 | 10.9 | 10.9 |
| 1.82 | 5.0 | 79.0 | 36.6 | 12.5 |
| 1.85 | 1.6 | 80.6 | 41.7 | 13.1 |
| +1.85 (sink) | 19.4 | 100.0 | 71.4 | 24.4 |
| | 100.0 | | | |

**CLEAN COAL**

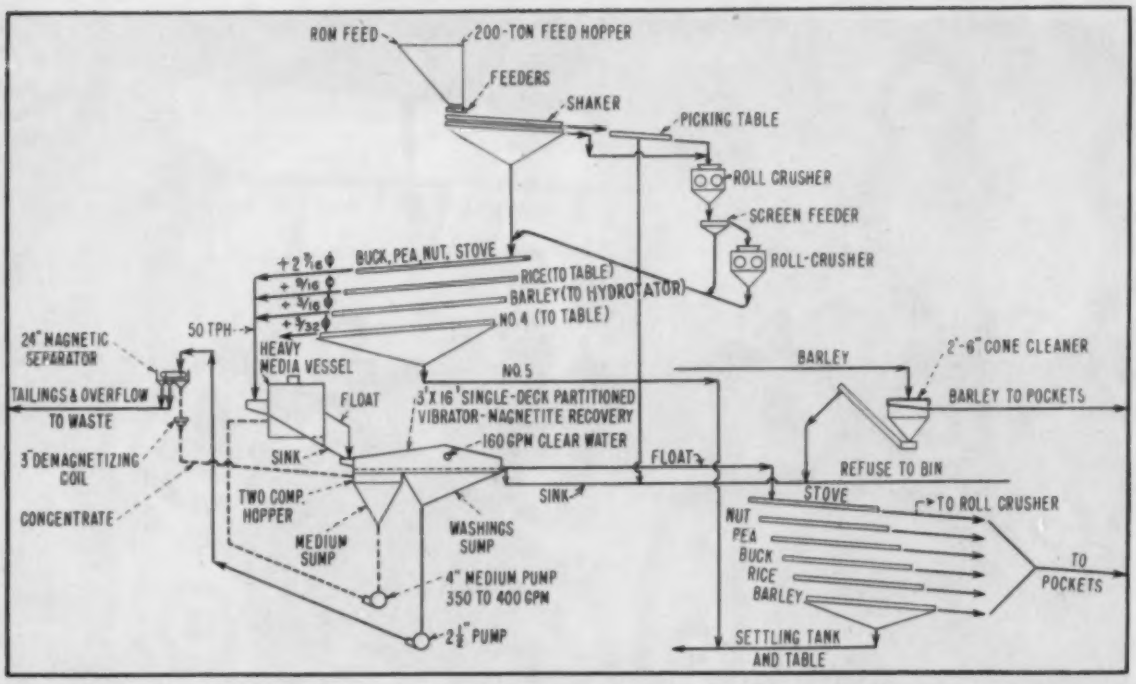
| Mesh | Weight, Percent | Cumulative Weight, Percent | Ash, Percent | Cumulative Ash, Percent |
|---|---|---|---|---|
| 1⅝ in stove | 29.5 | 29.5 | 10.8 | 10.8 |
| 13/16 in nut | 29.9 | 59.4 | 10.7 | 10.8 |
| ⅝ in pea | 11.5 | 70.9 | 11.7 | 10.9 |
| 5/16 in buck | 16.3 | 87.2 | 11.6 | 11.0 |
| ⅜ in rice | 8.5 | 95.7 | 12.3 | 11.2 |
| −⅜ in Undersize and smaller | 4.3 | 100.0 | 13.0 | 11.3 |
| | 100.0 | | | |

| Sp Gr | Weight, Percent | Ash, Percent | Calculated Ash, Percent |
|---|---|---|---|
| 1.80 | 98.60 | 10.9 | 11.3 |
| +1.80 | 1.40 | 37.8 | |
| | 100.00 | | |

**REFUSE**

| Mesh | Weight, Percent | Cumulative Weight, Percent | Ash, Percent | Cumulative Ash, Percent |
|---|---|---|---|---|
| 1⅝ un stove | 35.3 | 35.3 | 62.7 | 62.7 |
| 13/16 in nut | 30.1 | 65.4 | 63.0 | 62.8 |
| ⅝ in pea | 10.8 | 76.2 | 66.6 | 63.4 |
| 5/16 in buck | 13.1 | 89.3 | 66.2 | 63.7 |
| ⅜ in rice | 6.8 | 96.1 | 67.1 | 64.1 |
| −⅜ in Undersize and smaller | 3.9 | 100.0 | 66.9 | 64.2 |
| | 100.0 | | | |

| Sp Gr | Weight, Percent | Ash, Percent | Calculated Ash, Percent |
|---|---|---|---|
| 1.80 | 0.49 | 11.5 | 64.2 |
| +1.80 (sink) | 99.51 | 64.0 | |
| | 100.00 | | |




**FULL GRAVITY FLOW** in main plant, except for small elevating conveyor in clean stove-coal crushing circuit, is a feature of Blaschak cleaning pattern. Rough cleaning equipment is installed in separate structure to reduce vibration in main plant.

Separate sizes are chuted into eight truck-loading pockets, each of 70 to 80 tons capacity, from the six decks of the final shaker, the Buckwheat No. 4 table and the Hydrotator. The No. 5 coal is stored on the ground and loaded into trucks to be hauled as needed to a nearby railroad ramp. There is little point in building a bin for No. 5 coal since the normal truck trade favors the coarser sizes. Therefore, construction and maintenance of a bin would be uneconomical.

Magnetite recovery begins at the partitioned drain-and-rinse vibrating screen which receives the clean coal and refuse from the vessel. Fast-draining medium is collected in a sump under the leading portion of the screen to be pumped back to the vessel. Makeup water, 160 gpm, is introduced through sprays over the discharge half of the vibrator to wash the remaining medium into the washings sump. This dilute medium is concentrated in a single Memco magnetic densifier and returned to the main sump for recirculation through the system. A recent test taken over a 2-day operating period showed the magnetite loss to be 0.32 lb per ton of clean coal.

## EFFICIENCY BOOSTERS

The ground-stored No.5 coal and other sizes of clean coal stockpiled near the plant are picked up and loaded into trucks by a Hough Payloader equipped with a special 4-yd coal bucket. The Payloader also is used to transfer raw coal to the plant feed hopper as needed and in cleaning the access roads.

As is the case at many new plants, the Blaschak company had difficulties with muddy conditions around the plant, especially under the loading chutes, in the period soon after the plant was opened. A combination of spring rains last year and normal drainage from the trucks caused the loading area to be churned up and rutted. This problem was solved by bringing in a carload of blast-furnace slag to surface the loading area and other places around the plant that had been disturbed during construction of the plant. The slag is laid down and leveled, then traffic-bound ino a solid base by the trucks.

This economical surfacing not only improved the flow of traffic in peak loading periods but also saves wear and tear on the trucks of the customers and the company. It is a "must" if repeat business is to be built up to a worthwhile level, and if company maintenance requirements are to be kept down to a reasonable level.

A number of applications for aluminum pipe have been found by Blaschak officials, as mentioned earlier. In one of these, 500 ft of 6-in pipe is used in a line from the sump in the mine to a 58,000-gal storage tank on the surface. The head on the pipeline is equivalent to 300 ft of vertical column and the water analyzes 4.6 pH. The line has served for more than a year in supplying the tank with water to be used in the cleaning plant. One man can easily handle the 40-ft lengths of the lightweight pipe. Clean No. 5 coal from one of the wet tables is sluiced to ground storage through an aluminum line, also, and the middlings product from the rice table is similarly handled.

Recently the plant was covered with asphalt-shingle siding as a hedge against troubles that might occur in cold weather. With this covering in place, it is possible to heat the interior to a comfortable level through two Modine heaters. Circulating steam for the heaters is provided by a Losch burner in a Spencer boiler. Rice coal is conducted directly from the pocket to the magazine of the Losch unit through a 6-in pipe, thus making the system fully automatic.

The plant was designed by Wilmot Engineering Co. for the present through-put of about 70 tph. Emphasis on simple gravity-flow circuit make it possible to operate with only three men in the plant, namely, a heavy-media system operator, a man operating the tables and controlling flow to the pockets, and a plant maintenance man. In addition, there are two men working at the picking table.

**UNDERSTANDING AND COOPERATION,** two vital ingredients in safety progress, are attained by regular meetings of various types with everyone participating. Among them are portal meetings, such as the one shown, with Frank Gaddy, USBM, as speaker, which are held every other month at the seven mine openings.

### No lost-time injuries or fatalities from roof falls in 1956 as Inland Steel marks . . .

# Banner Year at Wheelwright

**Employees at Wheelwright and Price mines, in cooperation with managers and supervisors, complete a full calendar year without roof-fall injuries by marshalling human resources to match equipment advances.**

A SAFETY ACHIEVEMENT of the highest order is written into the records by the Wheelwright and Price, Ky., mines of Inland Steel Co. Not a single lost-time injury and no fatalities chargeable to roof falls occurred at these operations during the calendar year 1956. The total underground working force is 837, including face supervisors and 480 men classified as face workers, who in compiling the record in cooperation with management, produced 1,427,193 tons of coal during the year.

Inland's campaign grew out of management's concern over the 1955 record, which showed three roof-fall fatalities. This was entirely too high and in addition the fatalities occurred while men and company officials were conscientiously participating in the national campaign to reduce such accidents. It was decided then to see what could be done through the application of intense local effort. Competitive and noncompetitive incentives were employed and training efforts were expanded, but mine officials at Wheelwright feel that the program really took hold when a cross-section of the face workers was interviewed at work in an effort to learn their attitudes and their opinions of the safety program. More than 10% of the men in the sections were interviewed with the result that men and management started out with a mutual understanding of the problem involved in eliminating roof-fall accidents.

It should be stressed that the Inland campaign is a joint effort. Initiating the program is top management's responsibility, but the full cooperation of the workmen is necessary if the

campaign is to make the desired headway. Management's concern in preventing roof-fall accidents was made clear by H. O. Zimmerman, Inland Steel's manager of coal properties. As a result, a general committee was organized, including representatives of both labor and management.

Mr. Zimmerman, Arthur Bradbury, assistant to the manager of coal properties, and E. Minor Pace, general superintendent, are active members of the committee. Scott Hall, president of the local union, and the local mine safety committee — Burnis Moore, Orville Adkins, Ernest Boyd and Delbert Adams — also served. The views of mine supervisors were expressed in committee sessions by W. F. Hughes and Leon Porter, general mine foremen, and Blaine Cooper and Vernon Bailey, assistant foremen.

**Inland Steel's Six Steps to Improved Roof Safety:**

**1 Management assumes responsibility of initiating roof safety programs.**

**2 General Committee of labor and management representatives develops plans for program.**

**3 Attitudes and opinions of faceworkers, who are most vulnerable to roof hazards, are solicited.**

**4 Training sessions and safety meetings are scheduled to provide information and keep interest alive.**

**5 Short- and long-term incentives are designed to provide safety goals and mileposts.**

**6 Progress is recorded and vital information is posted for all to see.**

## DETERMINING ATTITUDES

In relating Inland's accident experience, Mr. Pace told how his company's change from hand-loading to mechanized methods had been virtually completed by 1950. In the 6-yr period, through 1955, 71 lost-time accidents resulting from roof falls had occurred among men in job classifications as follows:

| | |
|---|---|
| Loading-machine operators | 23 |
| Timbermen | 13 |
| Cutting-machine helpers | 11 |
| Loading-machine helpers | 4 |
| Cutting-machine operators | 4 |
| Shotfirers | 3 |
| Trackmen | 3 |
| Shuttle-car operators | 3 |
| Hand loaders | 3 |
| Coal drillers | 1 |
| Rock drillers | 1 |
| Brakemen | 1 |
| Foremen | 1 |
| Total | 71 |

Generally speaking, the number of men interviewed in the various job classifications reflected the accident experience of that classification. For example, 17 loading-machine operators gave their views on the matter because their job tops the 6-yr list in number of roof-fall injury occurrences. The number of men interviewed in other classifications is scaled downward from this maximum figure.

The interviews were conducted by one of the company's mining engineers, Elford A. Roberts, who spends most of his working time underground and is well known to the men. The interviewer visited 12 day-shift and 12 night-shift crews in talking with the workmen. A total of 52 men were formally interviewed.

The interviews were based upon a list of 25 questions designed to bring out the frank opinions of the interviewees. Among the more important opinions expressed by the workmen were these:

**Education and training,** including 100% accident-prevention training, play an important part in spreading the knowledge of roof action and in providing new ideas for controlling roof.

**Training is important,** even for miners of long experience, to counteract any letdown in watchfulness that might come from long association with the problems and hazards.

**Good leadership and management** are a prime influence. The foreman should take a positive attitude toward roof safety, and should not compromise with infractions of proper roof discipline. However, workmen cannot be relieved of their personal responsibility to protect themselves against roof falls.

**Many of the answers to roof control problems are known now.** What is needed is more intense application of what is known.

**Discipline slips or other penalties** could be applied to foremen or workmen for not adhering to minimum roof-control standards, provided all are aware of the policy, that the penalties are not discriminatory or arbitrarily applied, that penalties never become a substitute for teaching and understanding, and that they be used as a last resort.

Having these opinions and attitudes of the workman before them, the members of the general committee set to work to build a cohesive program based upon cooperation among all Inland Steel mine employees and officials. Purposes of the program, which is now being actively carried out, are:

1. **Keep the need for hour-by-hour roof** consciousness uppermost in the minds of workmen and officials.

2. **Provide reasonable incentives to** keep interest alive.

3. **Take note of violations** against accepted safety practices.

4. **Generate healthy competition** among crews with respect to safety.

The ways and means employed to reach these goals, which resulted in 1956 record of no roof-fall fatalities or lost-time injuries, included the following:

## ATTAINING SAFETY GOALS

Meetings among workmen, supervisors and managers are an important part of the program. Two types of meetings are held in alternate months. One is a general meeting at the Wheelwright community center and the other is a portal meeting for men and supervisors. The general meetings, which the families in the communities may attend, actually are safety rallies designed to remind everyone of the overriding importance of the subject. Programs may be provided by the company or by outside agencies.

Portal safety meetings stress the fundamentals of how to achieve safety underground. They also provide a practical demonstration of how labor and management have reached a high point in cooperation. The meetings are planned to last 20 min, with half the time donated by the men and half paid by Inland Steel. On the day a portal meeting is scheduled, the men report to the assembly room at the portal 10 min before normal departure time of the mantrip and departure time of the mantrip is delayed 10 min. Meetings like this are held at the seven portals on the Wheelwright and Price properties every second month for all shifts. The

## ASSISTANT FOREMEN'S

FROM _____ TO _____

| ACCIDENT EXPERIENCE | | | | | SAFETY EDUCATION | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ASSISTANT FOREMAN | MAN HOURS WORKED | LOST TIME ACCIDENTS | DAYS LOST | ACCIDENT DISCOUNT | GENERAL SAFETY MEETINGS | FOREMEN'S MEETINGS | SECTION SAFETY MEETINGS | SAFETY RULE IN-STRUCTION | CREDITS |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Discount charge for each lost-time accident will be as follows:

| | |
|---|---|
| 1 to 7 days lost time | 300 points |
| 8 to 30 days | 350 points |
| 31 to 60 days | 400 points |
| 61 to 90 days | 500 points |
| 91 to 181 days | 700 points |
| Over 180 days lost time | 1,000 points |
| Fatality or total disability | 2,000 points |

200 credits are awarded for attendance at each general safety meeting.

200 credits are awarded for attendance at each foremen's meeting.

200 credits are awarded for holding section safety meeting.

10 credits are awarded for each daily record of safety-rule instruction.

Discounts will be made for substandard conditions found during the monthly inspection (see Discount Sheet).

sessions are conducted by the safety director and the safety engineer, and since the roof-control campaign has been in full operation this subject gets a large share of attention. Section safety meetings are also held each month by the foremen with their own groups of workers.

Monthly meetings for supervisors also are included in the plan. At a monthly general meeting all supervisors from all departments are informed of the company's viewpoint and objectives on safety, production, costs and so on. Also, the general mine foremen meet with their staffs each month to discuss local specific problems in more detail. Thus, the full resources of the company can be brought to bear on major problems, and improving safety is one of the main subjects.

### USING SAFETY INCENTIVES

The incentive system at Wheelwright and Price is a carefully planned program, giving due consideration to the problems of maintaining interest on an annual basis and over shorter periods. For example, the company operates a Turkey Derby, in which the members of all crews achieving a year free of lost-time accidents receive a turkey for Christmas. But a year seems like a mighty long time when viewed from January, so the company awards special leather work gloves to the members of accident-free crews on a quarterly basis.

Quarterly awards for supervisors leading accident-free crews are suitably inscribed anemometers or safety lamps, and semiannual awards are convention trips to the National Safety Congress at Chicago, the Kentucky Mining Institute at Lexington, or the American Mining Congress conventions at Cleveland or Cincinnati.

However, the Inland Steel incentive system comes down to a still finer edge. Safety inspectors of the company post their reports of section inspections in the sections before the end of the shift on the inspection day. Since these inspections are made at frequent intervals, the men are informed without delay of their safety progress or lack of it. The form of the inspector's report is shown in an accompanying illustration.

Roof-control violations are entered with the name of the person committing the violation in the space provided for remarks. (It was shown in the original survey of the opinions of face workmen that they did not resent fairly-administered discipline.) Copies of this report are sent to the general superintendent for his information and action, to the general mine foreman for his action and routing to his staff, and to the safety department for filing. The purpose of this procedure is to provide timely information to all, and timely information is a valuable incentive.

Another form serving a similar purpose is the assistant foremen's ratings, as shown. This is posted periodically on the mine bulletin boards to show section crews how they rate in comparison with all other crews. A solid system of discounts and credits is employed in calculating the ratings. It is on the basis of these ratings that safety awards are made.

As this is written, the Inland Steel miners and supervisors have entered 1957 with their record intact. The consensus at Wheelwright is that cooperation and intense effort on the local level can bring gratifying results.

The main ingredients are management interest and employee cooperation.

## RATINGS

19____

| STANDING | TOTAL CREDITS | DISCOUNTS FOR SUBSTANDARD CONDITIONS | TOTAL DISCOUNTS | FINAL CREDITS | STANDING |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**EFFECTIVE SAFETY INCENTIVES** include not only tangible things, like turkeys, gloves and trips but also regular posting of safety inspection reports and foremen's safety ratings.

## INLAND STEEL COMPANY

WHEELWRIGHT, KENTUCKY

### SAFETY INSPECTOR'S REPORT

Date_____ Section No._____ Location_____

Foreman_____ No. of Places Inspected_____

**Substandard Conditions Noted**

| | Discounts | No. Violations | Total Discounts | | Discounts | No. Violations | Total Discounts |
|---|---|---|---|---|---|---|---|
| Failure to use goggles | 40 | | | Man-trip rules (No.____) | 35 | | |
| Failure to use respirator or dust collector | 40 | | | Improper riding on trips or locomotive | 45 | | |
| Coal dust accumulation | 40 | | | Obstruction of clearance | 40 | | |
| Disorderly lunch station | 35 | | | Failure to examine and test roof | 50 | | |
| Failure to maintain first-aid equipment | 40 | | | Failure to set safety post | 55 | | |
| Inspection and dating of working places | 40 | | | Substandard timbering or bolting | 55 | | |
| Rock dust beyond 40' limit | 40 | | | Safety posts improperly set | 35 | | |
| Improper storage of explosives | 40 | | | Guards not in place | 40 | | |
| Improper blasting with Airdox | 40 | | | Failure to cut off master switch | 45 | | |
| Airdox line and power cable in contact | 40 | | | Unguarded trolley wire | 40 | | |
| Place worked ahead of air | 50 | | | Ungrounded electrical equipment | 45 | | |
| Door left open | 50 | | | Improper fusing | 40 | | |
| Locking device not in place | 45 | | | Unfused trailing cable | 40 | | |
| Crossing cutter bar | 35 | | | Improper cable connections to track | 40 | | |
| Other violations listed below: | | | | Defective cable splices | 40 | | |
| | | | | Other violations listed below: | | | |

REMARKS:

| AIR MEASUREMENTS | | | |
|---|---|---|---|
| Location | Area | Velocity | Volume |
| | | | |
| | | | |
| | | | |

TOTAL DISCOUNTS_____

Inspector

Foreman

# Mine Acid Control: A New Approach . . .

**Reduced exposure to acid-forming material the most promising method of solving the acid problem. New mine of the Christopher Coal Co. will permit testing of the worth of frequent water discharge to cut down contact with sulphuritic materials.**

By S. A. BRALEY Ph. D.
Administrative Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa.

A HEARING Nov. 16, 1956, by the Sanitary Water Board of the Dept. of Health, Commonwealth of Pennsylvania, might fairly be noted as marking a new approach to the problem of acid mine water. On that date the board considered an application by the Christopher Coal Co., of West Virginia, a subsidiary of the Pittsburgh Consolidation Coal Co. for a permit to discharge mine water into the waters of the Commonwealth of Pennsylvania. The location of the proposed discharge point is in Greene County, Pennsylvania, near Mt. Morris, and the water will flow into Dunkard Creek. The application stated that this discharge was necessary for the experimental operation of a new mine in cooperation with the Mine Acid Control Fellowship at Mellon Institute. After due consideration of the fundamental nature of the experiment and preliminary data supplied by the fellowship and the engineering staff of the Sanitary Water Board, the permit was granted. It is the purpose of this paper to present in brief the background and contemplated procedure for this experimental operation.

## THE ACID PROBLEM

The discharge of acid water from coal mines is the most serious of all water-pollution problems. It is not new, as it has existed since the opening of the first mine in America on Coal Hill, now Mt. Washington, in Pittsburgh, Pa., in 1761. This mine, though long since worked out and abandoned, still produces acid drainage. The development of the coal industry, so fundamental to the industrial progress of the United States, has resulted in a tremendous increase in area of excavation and exposure of the acid-producing constituents of the coal measures and associated strata. The result is seriously polluted surface waters in most coal-producing areas. This condition directly affects domestic water supplies and necessitates expensive treatment procedures before industries can use stream waters in their operations. This condition in many of our streams has killed all aquatic life and destroyed the recreational facilities of our waterways.

In 1946, the Sanitary Water Board of the Department of

Health of the Commonwealth of Pennsylvania was confronted with a problem in the enforcement of the Pennsylvania Clean Streams Act, in which acids discharged from mines in operation prior to the passage of the act were specifically exempted from control. The opening of new mines required water discharge permits and, according to statute, these could not be granted if their discharge entered a clean stream or one used for domestic water supply. However, the exception of mine acid from the Clean Streams Act was only to continue until a satisfactory and feasible method of treatment became available. To study the existing conditions the Sanitary Water Board established a fellowship at Mellon Institute for the study of "Mine Acid Control."

## HOW ACID IS PRODUCED

A survey of the literature revealed that while much thought had been given the subject of acid water by many people, little really fundamental information was available. It was generally assumed that the acid was a result of the oxidation of pyrite, which assumption has, in part, been confirmed. The acid does come from the oxidation of sulphuritic compounds of iron in and associated with the coal measures. The rate of formation varies greatly with the physical form in which these materials exist.

At the time of initiation of this research, the Commonwealth of Pennsylvania also launched a "mine sealing" program patterned after the program carried on by the Federal Government under WPA. Studies of this procedure were carried on as part of the research program. The data obtained indicated that while the theory upon which mine sealing was based was correct, the application was ineffective, as there was usually no material reduction in oxygen concentration in the atmosphere in sealed drift mines due to air-permeability of the overlying strata, and that the quantity of acid issuing from these mines was relatively of the same order after sealing. In deep mines, where the coal seam does not outcrop and is entirely below drainage level, simple abandonment will cause the mine to flood and thus abate the acid production.

Pilot-plant studies of neutralization with lime or limestone proved that while such an acid drainage can be neutralized, the multiplicity of treatment plants, the quantity of limestone required, the engineering of the many plants, the necessary manpower and the difficulties of disposal of the resultant iron-hydroxide sludge ("yellow boy") made this procedure unfeasible. However, neutralization can and is being used in some emergencies, and for some standby operations.

## PREVENTION BY ENGINEERING

The studies to this point had not developed any feasible plan for treatment, and attention was then given to prevention of acid formation through better engineering of operations. Production of coal by strip mining methods had increased from 2.5% of the total in 1940 to 25% in 1946. After studying strip mine operations, it was felt that they could be revised in a manner to minimize acid production in strip pits and prevent pollution of the adjacent streams. Recommendations were made that pits be kept dry, and that sulphuritic or acid-producing spoil be segregated at the base of the spoil bank so that succeeding cuts or back-filling after coal removal would properly cover this material and prevent acid formation and discharge to the streams. Several experimental strip mines operating along these lines during 1949, '50 and '51, produced data which confirmed the theory. Such methods are now required by Sanitary Water Board permits in Pennsylvania, and are being used in most of the bituminous coal producing areas. While the general procedures are applicable in all cases, the manner of their application must be governed by conditions existing at each individual operation.

In 1953 the research funds of the Sanitary Water Board were about depleted and the coal industry, realizing the importance of the problem, assumed support of the research. The fellowship now operates under sponsorship of the coal industry, as represented by the Coal Advisory Committee of the Ohio River Valley Water Sanitation Commission.

## THE CHRISTOPHER PROGRAM

The success of the strip mine experiments, and the observation that water as it enters underground excavations is always alkaline, leads one to believe that if the water can be channeled through the mine without contacting long-exposed areas it will emerge from the mine with a minimum of acid pick-up. To prove this theory it was necessary to have a mine completely divorced from other abandoned operations. In 1951, a search began for such a mine, but always the new operations were extensions of old ones.

In 1955, the Christopher Coal Co. announced that it was opening a new mine on the West Virginia-Pennsylvania border. Immediate contact with President C. R. Nailler developed the fact that while this was an extension of some present operations, it is so located that all water from the old operations could be satisfactorily blocked from the new area. After much discussion and thorough consideration of the proposed experiment, Mr. Nailler expressed his willingness to cooperate in the experiment, although realizing that as an experiment it would increase the cost of operation, at least during the period of experimentation.

## FREQUENT DISCHARGE BASIC

The principal change from standard operating methods is that the water will be pumped to the surface at frequent intervals, instead of pumping it from sump to sump or permitting it to flow in open ditches from sump to sump, with eventual surface discharge at a common bore hole. It is also the intention to develop a large area for retreat mining rather than pillar of smaller areas concurrent with general development. This will delay roof collapse when the pillars are removed and permit entrance to all areas for water removal.

Exact details of operation are impossible to give at this time since adjustments in the program will be necessary as development progresses. The limited knowledge of the geologic conditions which exist in any area preclude laying out of specific details. Principles involved must be adjusted to conditions as they are found by excavation. The general lay of the coal seam may be known but small rises and dips cannot be predetermined. Water volume is also indeterminate and usually varies in different sections of a mine.

This operation is entirely experimental—based, we believe, on sound principles—but, however sound a principle, it is of no value if it is incapable of application. Capability of application can only be determined by experiment. Irrespective of results of this experiment, it is believed that the information obtained will be invaluable in further efforts to abate mine acid pollution. This experiment is also indicative of the interest of the coal industry in the problem and their willingness to cooperate in fundamentally sound experimentation. The Sanitary Water Board is also worthy of compliment for its interest and cooperation in an attempt to eliminate the pollution of our waterways from this source. Water is our most essential, and today critical, resource. It must be protected.

# Production and Cost Control

## What standards benefits are . . . How to set up standards . . .

By DANIEL C. SHEWMON*
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INDUSTRIAL ENGINEERING, in coal mining as in all other industries, has as its goal the control of production and cost through the establishment of production standards. With these, and with the proper type of daily production report, it is possible to spot losses and waste immediately and take the necessary corrective steps.

This article will outline some of the principles of industrial engineering and its application to mining, using an auger operation as example. Auger mining is less complex than many other types and thus lends itself better to illustrating application and results. The basic principles are the same, including the elimination of variables.

### HOW STANDARDS HELP

The benefits of a practical standard for augering or any other type of mining include the following:

1. The owner or manager of the equipment would have a better idea of what coal output to expect under various conditions or with various types of equipment. The more experience gained by an industrial engineer making studies on various types of equipment, the better ideas a manager would have on what types of equipment to purchase.

2. The owner would be able to ascertain the amount, cause and cost of delays.

3. Knowing the cause and cost in dollars of any particular delay or series of delays, the owner then could decide how much money he could spend to eliminate the delay or reduce its severity.

4. If desired, the men actually producing coal could share in the benefits resulting from their efforts by means of a fair bonus which can be made proportional to their pay and efforts, and would not be affected by delays of any kind, not even the constantly varying wait on trucks and shuttle cars.

5. The men receiving the bonus would naturally feel more responsible for the care and maintenance of the equipment, and would take pride in their work and their accomplishment.

*The auger study on which this article is based was made prior to Mr. Shewmon's connection with Pocahontas Fuel.

### AUGER AND CREW

The equipment used in this example was an auger making a 42-in hole, using a lump head with two spiders for support. The auger sections, or extensions, were 12 ft 7½ in long. A diesel tractor was used to move the auger from hole to hole. The coal was loaded into trucks with an average capacity of 17 tons for

## Eleven Musts in

**IN APPLYING STANDARDS** to control cost and production in augering, or in any other type of mining, either above or below ground, certain basic principles must be kept in mind. These, totalling eleven, are as follows:

**1. Standards should be simple and easily understood.** A system that is mysterious, complicated or cumbersome is hard to apply, difficult to change should conditions change, and too time-consuming for a busy owner or manager to wade through each day. Rather, standard controls should be presented in such a way to the owner or manager that he can look at the daily figures, get a quick picture of what his equipment has done the day before, see how delays occurred, and ascertain the actual money loss of each delay. Then he can make his decisions for the day then and there. A manager looking at a few facts and making concrete decisions concerning these facts is more effective than one who must pour over a tremendous array of figures which require much remembering, much mental comparison with past figures, much interpretation, and much time to digest, yet do not add much beyond bulk to his files.

**2. Standards should be designed to tell an owner not that he lost a certain amount of money alone but how and exactly where he lost** it so that he can do something quickly if he wishes to cut down or eliminate the loss.

**3. To get the most out of a standards program,** an owner or manager aiming at improving his operation should take an active interest in the program, understand its basic principles and be its most powerful salesman so that all others within the organization can see and hear, and thus more quickly accept and participate in standards for their own best interest and also for that of the company.

**4. Application of standards should be thorough** so that no backtracking is necessary later. A sloppy standard, set either too loose or too tight, gives the standard-setters and company a bad name. It may prevent the company from ever having another program even though the new program is both accurate and fair, because dis-

# Through Industrial Engineering

## How to use control standards

the haul to the preparation plant.

Drilling was done on two shifts by very competent crews. Each crew consisted of a setup man who controlled the rig and was responsible for its production, spot repairs, maintenance, and the work of the other crew members. The second crew member rode and operated the drilling head under the direction of the setup man. The third man, or helper, aligned the auger extensions, pulled the extension coupling pins, and guided the extensions during their transit to and from the storage racks. He also operated the tractor when moving the rig, and spotted unoccupied trucks under the loading boom.

Each truck driver had his own assigned truck. An unassigned truck was used as a standby. No matter how many trucks were used there was usually one less driver.

Lubrication and preventive maintenance were done during the last half hour of each working shift. All the fuel tanks were filled, lubrication points serviced, and small repairs made. For this reason, the auger crew was paid for 8 hr, and the truck crew paid for 7½ hr.

A shovel and dozer operated one shift per day, keeping the coal faced up ahead of the drill rig. A mechanic was charged to the auger and allied equipment for five shifts per week. These three men, considered to be contributory or nonproducing labor, are not here considered for standards work, although their jobs could be studied and standardized using similar principles.

### STUDYING THE AUGER

The first step preceding the time study of the auger—a necessary prerequisite to the setting of the standards—was breaking down the drilling and hauling cycles into elements that could be timed.

The drilling cycle was closely watched and the work split up into parts or elements which could be adequately described and then timed. Each element could then be properly timed by anyone having a list of these elements. The description of the elements includes the "Start" and "Stop" points, arranged so that the stop point of one element is the start point of the next.

If watch times cannot be reasonably consistent in a study of elements of this type, then the element in question should be broken down into still smaller elements. Each element, however, should include as much work as possible while still being consistent in time. Care should be used in describing an element so that it can be written quickly but still recognized. For instance, instead of using the words "Auger Extension" the word "Bit" has been substituted.

This type of time study is well known as the "Standard Data Time-study System." Some of the advantages of such a system are that times

## Setting Good Standards

appointment following the failure of a poor standard sometimes leads to real reluctance to initiate another.

**5. In initiating standards, owners or management should not load the standards men with jobs not connected with their regular work.** This is especially true while standards are being initiated, and becomes more understandable as the department grows in stature and experience.

**6. Care should be taken that highly skilled standards men do not waste their time** doing routine reports or work that others can and should do.

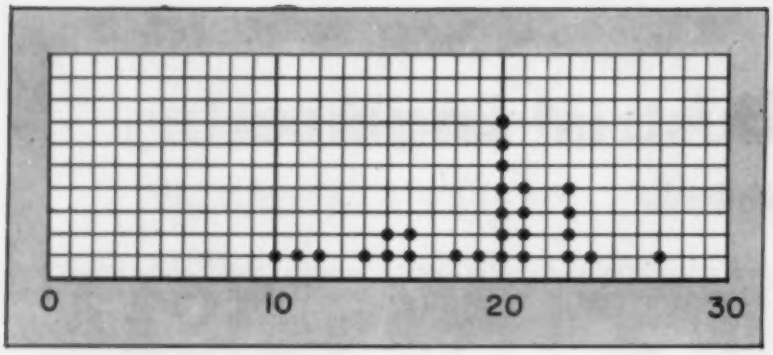
**7. The owner or manager, when he has his forecasts of improvements before him and has compared with past performance should not let his enthusiasm be dampened by his past showings.** If he can raise production with standards, his superiors cannot criticize past performance when standards were not available. Men should be praised for progress and criticized only for holding it back.

**8. Production men should not feel that men in standards are trying to muscle into their sphere.** Rather, standards men are, in a sense, only toolmakers. Production takes these tools and uses them, thus, it is hoped, doing the job better and, as a matter of fact, getting more satisfaction and credit for themselves.

**9. Standards men should rarely give orders to workers.** Giving orders is the job of production only.

**10. Care must be taken by the owner or manager to keep production and standards a little apart and on an even plane** so that the two can work side by side for the betterment of the company.

**11. The owner or manager must not expect too much too soon.** Standards can point the way to maximum results in production but attaining these results is a long hard process in which everyone must still take part.




"MODE CHART" quickly shows the proper times to use in setting standards for a particular operation—in this instance, running drill head back.

## Table I—Standard Auger Work Plan

| | Number Auger Extensions, or Bits, Each 12.63 Ft Long | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Feet Drilled | | | | | | | |
| | 38 | 50 | 63 | 76 | 88 | 101 | 114 | 126 |
| **Prepare to move** | 0.54 | | | | | | | |
| First pivot | 0.16 | | | | | | | |
| Reposition dozer | 0.72 | | | | | | | |
| Second pivot | 0.16 | | | | | | | |
| **Level and prepare** | 1.06 | | | | | | | |
| Change 1 drill bit | 0.46 | | | | | | | |
| **Drill No. 1 head bit** | 1.70 | | | | | | | |
| Head back | 0.20 | | | | | | | |
| Bit on | 0.16 | | | | | | | |
| **Drill No. 2 bit** | 2.95 | 3.73 | 3.86 | 4.19 | 5.17 | 6.29 | 7.14 | 8.06 |
| Head back | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | ....* | 0.20 | 0.20 |
| Bit on | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | ....* | 0.16 | 0.16 |
| **Drill No. 3 bit** | 3.67 | | | | | | | |
| **Truck changeout** | .... | 0.71 | 0.71 | 0.71 | 0.71 | 1.42 | 1.42 | 1.42 |
| Number changeouts | .... | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **Pull three bits back** | 0.25 | 0.26 | 0.28 | 0.31 | 0.35 | 0.41 | 0.46 | 0.51 |
| Bit up | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Head in | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| **Pull two bits back** | 0.24 | | | | | | | |
| Bit up | 0.33 | | | | | | | |
| **Head in** | 0.14 | | | | | | | |
| Pull No. 1 head bit back | 0.24 | | | | | | | |
| **Cycle time, previous hole** | .... | 13.81 | 19.34 | 25.02 | 31.06 | 37.41 | 46.00 | 55.85 |
| **Total cycle time** | 13.81 | 19.34 | 25.02 | 31.06 | 37.41 | 46.00 | 55.85 | 66.67 |

*One time each of "Head back" and "Bit on" done during truck changeout and therefore not included.

taken are realistic and consistent, and can be reassembled into various orders of work. In taking the times, if one small element time is missed, the remaining times are still obtained and consequently little is lost. On the other hand, if a whole cycle is being timed, any interruption or irregularity makes the resulting time meaningless.

In taking times, the elements and their start-stop points are memorized, and the timestudy man records them as they occur, writing them on a piece of paper usually printed to facilitate the work. An 8x5-in sheet on an 8x5-in clipboard is very convenient. The watch should be the snapback variety graduated in hundredths of minutes.

The different times taken for any one element are compared with each other rather than averaged. This is done by means of a "Mode Chart," one such chart being prepared for each element. For instance, times in hundredths of minutes for running a drill head back to insert another auger extension could be as follows: 14, 21, 20, 16, 24, 27, 20, 20, 21, 23, 20, 21, 21, 19, 16, 18, 23, 23, 20, 15, 15, 12, 10, 20, 23, 20, 11. The mathematical average of these times is 19. If each number is plotted on a mode chart, however (see accompanying example), visual inspection will eliminate the odd or freak times and reveal the time occurring most frequently.

Although the average in this example is 19, the mode is 20. The mode automatically eliminates abnormal times without discarding them for inspection. The number to be used is 20. Mode charts many times indicate a proper time which is far different from an average time which has been badly influenced by unnatural performance, poor watch readings, or an occasional wrong start-stop point.

Almost all the elements to be studied in auger drilling are machinery operations. There are, however, some elements involving human effort and the factor of fatigue. Wherever these man-pace elements are studied, sufficient rest or "relax" time should be added to each element over and above normal work time so that when the job or cycle has been completed the operator has taken his rest time and is ready to start the cycle again. Enough relax should be given to each element so that the person can perform that particular operation an entire shift without getting unduly exhausted. In this way, when setting standards on work involving human effort, different relaxes are given as the elements are assembled to cover the different efforts necessary to do the work. When these relaxes are added to the actual times, the results are called "Standard Times."

If incentives are set on these man-pace operations, the only way the incentive output can be achieved is by working faster than the steady normal pace. This can be done only if the man takes a little less rest than is allowed in the standard. It is commonly accepted that if a fair and proper relax is given to all man-pace elements, a skilled person can be expected to perform 25% over standard. This would mean 75 capacity minutes of work in one actual hour of time. Putting it another way, maximum performance expected is 125%. Any bonus system should, in part at least, be based on this performance.

Now if both man and machine are working together on the same job, and it is expected that both will finish their separate operations together in cycle, it stands to reason that if the man is given a fair and adequate rest period, then to keep the machine from getting farther and farther ahead it also must have a rest allowance. If a man is expected to reach a maximum performance of 125%, then enough additional time must be added to machine-pace elements so

that they too can attain a maximum performance rate of 125%. The personal needs of the operator also must be considered. Therefore, the added machine time should be increased another 6%. Thus all machine-pace elemental times regardless of industry or machine type, are increased by 31% to become standard. This factor of 1.31 is also calculated as 5% over and above capacity, or 125% x 105%= 1.31.

All but one element of auger drilling is machine pace, so that each actual or raw time taken could have been multiplied by 1.31. Rather than this, however, it was less work to "mode-out" the raw times of each element and then multiply the resulting mode time by 1.31, making a "Standard-Time" for the particular element. The remaining man-pace elements is "Change Head Bit." Here, about 8 or 10 carbide-insert bits had to be changed each shift, or one per hole. Relax for this was 15%.

## CYCLE BREAKDOWN

The drilling cycle on the auger was broken down into the following elements with start and stop points and standard times as indicated:

STD. TIME MIN.

DRILL #1 HEAD BIT .. 1.70
START: When cutting bits hit coal at full rotation.
STOP: When drill pressure is released.

DRILL WITH ADDED EXTENSIONS (each added extension results in a reduced drilling rate).
START: When rotation and feed are full.
STOP: When drill pressure is released.

| | |
|---|---|
| #2 Bit | 2.95 |
| #3 Bit | 3.67 |
| #4 Bit | 3.73 |
| #5 Bit | 3.86 |
| #6 Bit | 4.19 |
| #7 Bit | 5.17 |
| #8 Bit | 6.29 |
| #9 Bit | 7.14 |
| #10 Bit | 7.99 |
| #11 Bit | 8.78 |

HEAD BACK ..... 0.20
START: When drilling stops. Include uncoupling chuck from flights and tramming drilling head back.
STOP: When head stops rearward motion.

EXTENSION (BIT) ON . 0.16
START: When head stops at rear of rig. Include dropping new bit into position and connecting it to both the previous extension and drill chuck, and bringing rotation up to speed.
STOP: When normal feed starts.

PULL BITS BACK
START: When head and connected bits start back. Include pulling back entire section of auger extensions far enough to extract one extension. (This time varies with the number pulled back.)
STOP: When drilling head stops rearward motion.

| No. Bits Back | |
|---|---|
| 1 | 0.24 |
| 2 | 0.24 |
| 3 | 0.25 |
| 4 | 0.26 |
| 5 | 0.28 |
| 6 | 0.31 |
| 7 | 0.35 |
| 8 | 0.41 |
| 9 | 0.46 |
| 10 | 0.51 |
| 11 | 0.59 |

BIT UP ..... 0.33
START: When head stops at rear. Include disconnecting and lifting bit clear of drill head.
STOP: When head starts forward.

HEAD IN ..... 0.14
START: When rising extension is in the clear and drill head starts forward.
STOP: When drill head stops forward motion.

PREPARE TO MOVE ... 0.54
START: When #1 head bit has cleared hole. Include leveling drill rig and positioning persons for move, one on the dozer, the other two marking the move-over distance so the dozer operator can see the marks.
STOP: When rig starts moving.

1ST MOVE-OVER ..... 0.16
START: When rig starts moving. Include moving one pad to exact position for next hole, rig pivoting on one pad extended slightly beyond the others.
STOP: When movement stops.

REPOSITION DOZER ... 0.72
START: When rig stops moving. Include unhooking tow cable, moving dozer to other end of drill rig, and hooking other tow cable.
STOP: When rig begins 2nd move.

2ND MOVE OVER ..... .16
Same as first.

LEVEL UP, PREPARE TO DRILL ..... 1.06
START: When 2nd move-over is complete. Include leveling rig and moving rotating bits to the coal face.
STOP: When bits fully contact coal.

CHANGE ONE HEAD BIT ..... 0.46
START: When wrench touches on bit box. Include removing worn bit, inserting sharp bit and tightening bolt.
STOP: When bolt is tight. (Note: this is done immediately after the move-over so that no walking time is necessary.)

## TRUCKING ANALYSIS

Truck haulage was broken down into elements fitting three categories:

1. Truck time hauling along the outcrop from the auger to the top of the incline. This varies according to the location of the auger and gradually increases. The variable time was set up to change every 100 yd and is determined from the number of hundreds of yards.

2. Truck time hauling up and down the incline from the outcrop to the main road. As the inclines are moved along the outcrop every few miles to take advantage of the faster haul on a macadam road in the valley, these times will be changed to fit the grade and bed conditions of the new inclines.

Also in this category, and changing

## Table II—Minutes of Standard Truck Wait for Auger

**Only for 17-ton trucks of one specific design, Tipple "X" and Incline "Y" up to the outcrop road**

| One-Way Haul, Yd | Hole Length in Number Auger Extensions, or Bits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | Cycle Time, Minutes | | | | | | | | | |
| | 5.04 | 8.82 | 13.81 | 19.34 | 25.02 | 31.06 | 37.41 | 46.00 | 55.85 | 66.67 |
| **Two Trucks** | | | | | | | | | | |
| 0 | 0.191 | 0.851 | 1.001 | 0.506 | 2.138 | 1.951 | 6.050 | 3.403 | 3.359 | 3.614 |
| 100 | 0.398 | 1.265 | 1.622 | 1.335 | 3.164 | 2.780 | 7.500 | 5.060 | 5.223 | 5.168 |
| 200 | 0.605 | 1.679 | 2.243 | 2.164 | 4.200 | 3.609 | 8.950 | 6.717 | 7.087 | 6.722 |
| 300 | 0.812 | 2.093 | 2.864 | 2.993 | 5.236 | 4.803 | 10.400 | 8.374 | 8.951 | 8.276 |
| 400 | 1.019 | 2.507 | 3.483 | 3.822 | 6.272 | 6.046 | 11.850 | 10.031 | 10.815 | 9.830 |
| 500 | 1.226 | 2.921 | 4.106 | 4.651 | 7.308 | 7.289 | 13.300 | 11.688 | 12.679 | 11.384 |
| 600 | 1.433 | 3.335 | 4.727 | 5.480 | 8.344 | 8.532 | 14.750 | 13.345 | 14.543 | 12.938 |
| 700 | 1.641 | 3.751 | 5.351 | 6.306 | 9.379 | 9.774 | 16.200 | 15.003 | 16.409 | 14.489 |
| **Three Trucks** | | | | | | | | | | |
| 800 | | 0 | | | | | | | | |
| 900 | | 0.082 | 0 | | 0 | | | | | 0 |
| 1,000 | | 0.319 | 0.284 | | 0.314 | 0 | | | | 0.564 |
| 1,100 | | 0.556 | 0.639 | 0 | 0.728 | 0.230 | | | | 1.372 |
| 1,200 | 0 | 0.793 | 0.994 | 0.379 | 1.552 | 0.915 | 0 | | 0 | 2.556 |
| 1,300 | 0.072 | 1.030 | 1.349 | 0.853 | 2.380 | 1.908 | 0.136 | | 0.485 | 3.740 |
| 1,400 | 0.190 | 1.267 | 1.704 | 1.327 | 3.208 | 2.903 | 1.297 | 0 | 1.018 | 4.924 |
| 1,500 | 0.308 | 1.504 | 2.059 | 1.801 | 4.036 | 3.897 | 2.458 | 0.506 | 1.551 | 6.108 |
| 1,600 | 0.426 | 1.741 | 2.414 | 2.275 | 4.864 | 4.891 | 3.619 | 1.452 | 2.084 | 7.292 |
| 1,700 | 0.545 | 1.978 | 2.769 | 2.749 | 5.692 | 5.885 | 4.780 | 2.398 | 2.617 | 8.476 |
| 1,800 | 0.664 | 2.215 | 3.124 | 3.223 | 6.520 | 6.879 | 5.941 | 3.344 | 3.150 | 9.660 |
| **Four Trucks** | | | | | | | | | | |
| 1,900 | | 0 | 0 | 0 | | | | | | |
| 2,000 | | 0.043 | 0.031 | 0.113 | | 0 | | | | |
| 2,100 | | 0.250 | 0.305 | 0.313 | | 0.279 | 0 | | | |
| 2,200 | | 0.457 | 0.616 | 0.513 | 0 | 0.900 | 0.625 | | | |
| 2,300 | 0 | 0.664 | 0.927 | 0.713 | 0.354 | 1.521 | 1.350 | | | |
| 2,400 | 0.011 | 0.871 | 1.238 | 1.142 | 0.872 | 2.142 | 2.075 | | | |
| 2,500 | 0.115 | 1.078 | 1.549 | 1.556 | 1.390 | 2.763 | 2.800 | 0 | | |
| 2,600 | 0.218 | 1.285 | 1.860 | 1.970 | 1.908 | 3.384 | 3.525 | 0.480 | | |
| 2,700 | 0.322 | 1.492 | 2.171 | 2.384 | 2.426 | 4.005 | 4.250 | 1.308 | 0 | |
| 2,800 | 0.425 | 1.699 | 2.482 | 2.798 | 2.944 | 4.626 | 4.975 | 2.137 | 0.064 | |
| 2,900 | 0.529 | 1.906 | 2.793 | 3.212 | 3.462 | 5.427 | 5.700 | 2.963 | 0.996 | |
| 3,000 | 0.632 | 2.113 | 3.104 | 3.626 | 3.980 | 5.868 | 6.425 | 3.794 | 1.928 | |
| 3,100 | 0.736 | 2.320 | 3.415 | 4.040 | 4.498 | 6.489 | 7.150 | 4.623 | 2.860 | 0 |
| 3,200 | 0.839 | 2.257 | 3.726 | 4.454 | 5.016 | 7.110 | 7.857 | 5.451 | 3.792 | 0.357 |
| 3,300 | 0.943 | 2.734 | 4.037 | 4.868 | 5.534 | 7.731 | 8.600 | 6.280 | 4.725 | 1.393 |
| 3,400 | 1.046 | 2.941 | 4.348 | 5.282 | 6.052 | 8.352 | 9.325 | 7.108 | 5.657 | 2.429 |
| Etc. | 1.150 | 3.148 | 4.659 | 5.696 | 6.570 | 8.973 | 10.050 | 7.937 | 6.589 | 3.465 |

with each new incline, is the haul time along the macadam road between the incline and the tipple.

3. Truck time at the tipple itself. This time is constant and would not be changed unless a new tipple site is used.

After studying the truck haulage and using modes to determine the raw or actual times for each element, the following standard times were found for the particular haulage situation at that time. As the top of the incline was within a few feet of the auger during the study, the measured rate of truck haul, both empty and loaded, between the incline and auger should be considered unsatisfactory for actual standards but suitable for use in this study.

| | Std. Time, Min. |
|---|---|
| Loaded truck down incline | 4.96 |
| Load from incline to tipple | 4.00 |
| Turn and back up ramp | 0.93 |
| Dump load, secure bed | 1.18 |
| Turn off tipple ramp | 0.45 |
| Empty from tipple to incline | 2.08 |
| Empty truck up incline | 2.23 |
| Turn and spot truck for change-out | 1.48 |
| Truck change-out at auger | 0.71 |
| Truck speed, loaded | 122 yd per min |
| Truck speed, empty | 159 yd per min |

### STANDARD WORK PLAN

When all the elements have been repeatedly timed and "moded out," and each raw mode time has been multiplied by 1.31 to convert it to standard time, the "Standard Work Plan," Table I, is made. This can be done in various ways, the simplest being to make a separate and complete standard work plan for each hole, or ten in all. The benefit is that in describing each element in its proper place as it occurs no chance is left for any errors of presentation. The drawback is that it would be tedious to do and would result in 10 sheets, each successively longer.

The data in Table I, in comparison, have been presented in condensed form for easier consideration. If all the elements needed for any one hole are compared to those of a hole one bit or extension deeper, it can be seen that the only difference is in the elements needed to drill the additional extension and then get it back out of the hole, plus the additional truck change-out or change-outs, as the case may be. Therefore, to get the total cycle time for a hole of any particular number of extensions or bits in depth, all that is needed is the previous cycle time plus the elements concerning the actual drilling of that particular segment of hole.

For example, the cycle time for a hole drilled with four bits or extensions (50 ft deep) is found by taking the cycle time for drilling a hole three bits deep, and adding a truck change-

## DAILY AUGER PRODUCTION REPORT

AUGER NO. 1 TRUCKS USED 4 DATE 12-19-56

YARD OF ONE-WAY HAUL 3400 SHIFTS A + B

| 1st SHIFT | | | | 2nd SHIFT | | | |
|---|---|---|---|---|---|---|---|
| Hole No. | Bits Per Hole | Std. Drill Cycle | Std. Truck Wait | Hole No. | Bits Per Hole | Std. Drill Cycle | Std. Truck Wait |
| 569 | 5 | 25.0 | 6.1 | 579 | 6 | 31.1 | 8.4 |
| 70 | 7 | 37.4 | 9.3 | 80 | 7 | 37.4 | 9.3 |
| 71 | 7 | 37.4 | 9.3 | 81 | 8 | 46.0 | 7.1 |
| 72 | 6 | 31.1 | 8.4 | 82 | 7 | 37.4 | 9.3 |
| 73 | 8 | 46.0 | 7.1 | 83 | 9 | 55.9 | 5.7 |
| 74 | 7 | 37.4 | 9.3 | 84 | 9 | 55.9 | 5.7 |
| 75 | 4 | 19.3 | 5.3 | 85 | 10 | 66.7 | 2.4 |
| 76 | 2 | 8.8 | 2.9 | 86 | 2 | 8.8 | 2.9 |
| 77 | 8 | 46.0 | 7.1 | 587 | 8 | 46.0 | 7.1 |
| 578 | 8 | 46.0 | 7.1 | | | | |
| 10 | 62 | 335 | 72 | 9 | 66 | 385 | 58 |
| Tons/Bit = 5 | | | | | 5 | | |
| Est. Tons 310 | | | | | 330 | | |

**DAILY BASE WAGES**

| Job | Men | Rate | Wage | Shift |
|---|---|---|---|---|
| Drillers | 3 | 24.56 | 73.68 | |
| Truckers | 3 | 20.30 | 60.90 | 1st |
| 1st Shift Total | | | | $134.58 |
| Drillers | 3 | 24.88 | 74.64 | |
| Truckers | 3 | 21.97 | 65.91 | 2nd |
| 2nd Shift Total | | | | $140.55 |
| Total Base Wages | | | | |
| Shovel | 1 | 28.20 | 28.20 | |
| Dozer | 1 | 23.20 | 23.20 | |
| Mechanic | 1 | 23.20 | 23.20 | |
| Total Non-Productive | | | | $74.60 |

**DAILY PRODUCTION TOTAL**

| No. of Holes | Bits Drilled | Std. Cycle Min. | Std. Min. Truck Wait |
|---|---|---|---|
| 19 | 128 | 720 | 130 |
| Tons/Bit = 5 | | | |
| Est. Tons 640 | | | |

**AFTER STANDARDS ARE SET,** control over production and cost is attained through production and delay reports.

out of 0.71 min; the time necessary to drill a bit length when four bits are rotating together (3.73 min); the time to pull the head back (0.20 min) and put the fourth bit on (0.16 min); the time to pull back four bits (0.26 min) one segment, and raise the fourth bit up out of the way of the head (0.33 min); and finally, the time to get the head back to the three remaining bits in the hole (0.14 min). In this manner the entire table is worked out.

Since one truck held 17 tons, and one auger extension or bit drilled about 5 tons of coal, a second standard work plan (not shown) was worked out to see if any savings in time could be made by loading only 15 tons, or three even bits' drilling of coal, and then changing out trucks while bits were being added. The following results were obtained:

| REPORT ON DELAYS TO AUGER & REMARKS | | | | STANDARD |
|---|---|---|---|---|
| Shift | | Min. Delay | Std. Cost Per Min. | Cost of Min. Lost |
| | Out of R.R. cars | 26 | $.39039 | $10.15 |
| | Replace tyds. | | | |
| 1st | hose on hoist | 32 | | 12.49 |
| | Move rig across | | | |
| | pumhout | 10 | | 3.90 |
| | Truck Wait | 72 | | 28.12 |
| Shift Total | | | | |
| | New helper | | | |
| | | | | |
| 2nd | | | | |
| | | | | |
| | | | | |
| | Truck Wait | 58 | | 22.64 |
| Shift Total | | | | |
| Grand Total | | 198 | $.39039 | $77.30 |

| Bits Drilled | Cycle Time, Min |
|---|---|
| 3 | 13.81 |
| 4 | 18.98 |
| 5 | 24.66 |
| 6 | 30.70 |
| 7 | 38.11 |
| 8 | 47.06 |
| 9 | 56.91 |
| 10 | 68.08 |

There is only a small difference between the cycle times whether the trucks are loaded fully with 17 tons as shown in Table II or whether the trucks are changed out every three bits or 15 tons. However, as the second plan showed the slower times, it was discarded.

While the drill cycle was being timed, a bit change occasionally would occur while the helper was busy doing something else. Each time this occurred during the studies, the new helper element times performed by the operator or setup man were recorded. Although not enough times were taken to get a satisfactory mode, they were none the less incorporated into a third standard work plan to show the cycle times drilling without a helper. The results are as follows:

| Bits Drilled | Cycle Time, Min |
|---|---|
| 3 | 14.73 |
| 4 | 20.72 |
| 5 | 26.86 |
| 6 | 33.36 |
| 7 | 40.88 |
| 8 | 49.61 |
| 9 | 59.92 |
| 10 | 71.20 |

These standard cycle times could be used in place of the three-man cycle times, should one of the three men in the crew be absent, to maintain the principle of standard control.

From the particular truck haulage data taken, the truck-wait table (Table II) is calculated. It is not the purpose of this article to go into this phase beyond indicating that truck wait does not have to be a problem any longer. Rather than a table for each number of trucks, a composite table was prepared showing how the waits vary for the different number of trucks used. It shows that a truck must be added every 800 to 1,000 yd to keep wait to a practicable minimum. There is no limit to the number of trucks that can be correctly accounted for.

## PRODUCTION AND COST CONTROL

After the standard cycle times have been determined a daily report on production must be designed. It can take various forms, any one of which could be satisfactory, since the main purpose of the report is to make possible immediate positive action in the right direction to eliminate wasted dollars. The report prepared for this particular auger operation is reproduced herewith, along with the delay report which goes with it.

The field foreman enters the number of each hole drilled, the delays encountered on each shift, the distance hauled, the number of trucks used, and the men worked. Using Table II, the production and delay reports are completed in the office to present production, labor cost and delay cost.

The total times shown on the completed reports are minutes of standard work done in an actual clock time of 480 min per shift minus 30 min for lunch, 30 min for end-of-shift maintenance and fueling, and the time of delays encountered.

The maximum number of drill-cycle minutes in a single shift would be 480 less 30 and 30, or 420, multiplied by 125%, which equals 525 "Standard Cycle Minutes." Therefore, if delays during the first shift are 26, 32, 10 and 72 min, clock minutes available for work are 480 minus the total of lunch, maintenance and delay times (200 min), or 280 min. In this 280 min of actual time, the crew performed 335 standard minutes of work, and thus earned pay for 55 "bonus" minutes, representing extra effort. Putting it another way, it is possible for the auger crew, working at top speed and effort, to attain a rate of 125 standard minutes during a period of 100 clock minutes, thus earning a 25% bonus.

The "Standard Cost Per Minute" shown in the production and delay examples is labor cost which must be repaid by auger production. Other costs—fixed, materials and so on—could be added if desired. Moving underground, total labor cost per minute for a 10-man mechanized section is about $2. To this must be added fixed costs, which might be another $1, making $3 in all. This figure naturally will vary from mine to mine. This same cost is generally considered to be $0.20 per man-minute for each face man, including all day work, haulage, tipple, shop and outside service labor, office personnel and money for special services.

The purpose of standards is control of production and its cost. The method is determining standard costs and actual cost and then doing something about the difference. Standards are the basis for a bonus system which results in more people taking an active interest in increasing production and eliminating waste of all types.

Standards enable a person to spot wastes the day after they occur. This is important, since an owner or manager can look for waste and see at a glance his major losses or possible reductions in cost. For instance, by watching the cost per shift of truck wait, another truck and driver can be added at the proper time, in this instance when the cost of truck wait reaches $25 or $30 per shift, thus restoring full production. This is in contrast to spending lengthy periods studying weekly or monthly cost sheets and then wondering why the costs vary and where they could be reduced. It must be remembered, however, that the worth of a standards program is directly proportional to the efforts made to reduce the wastes indicated by the standards.

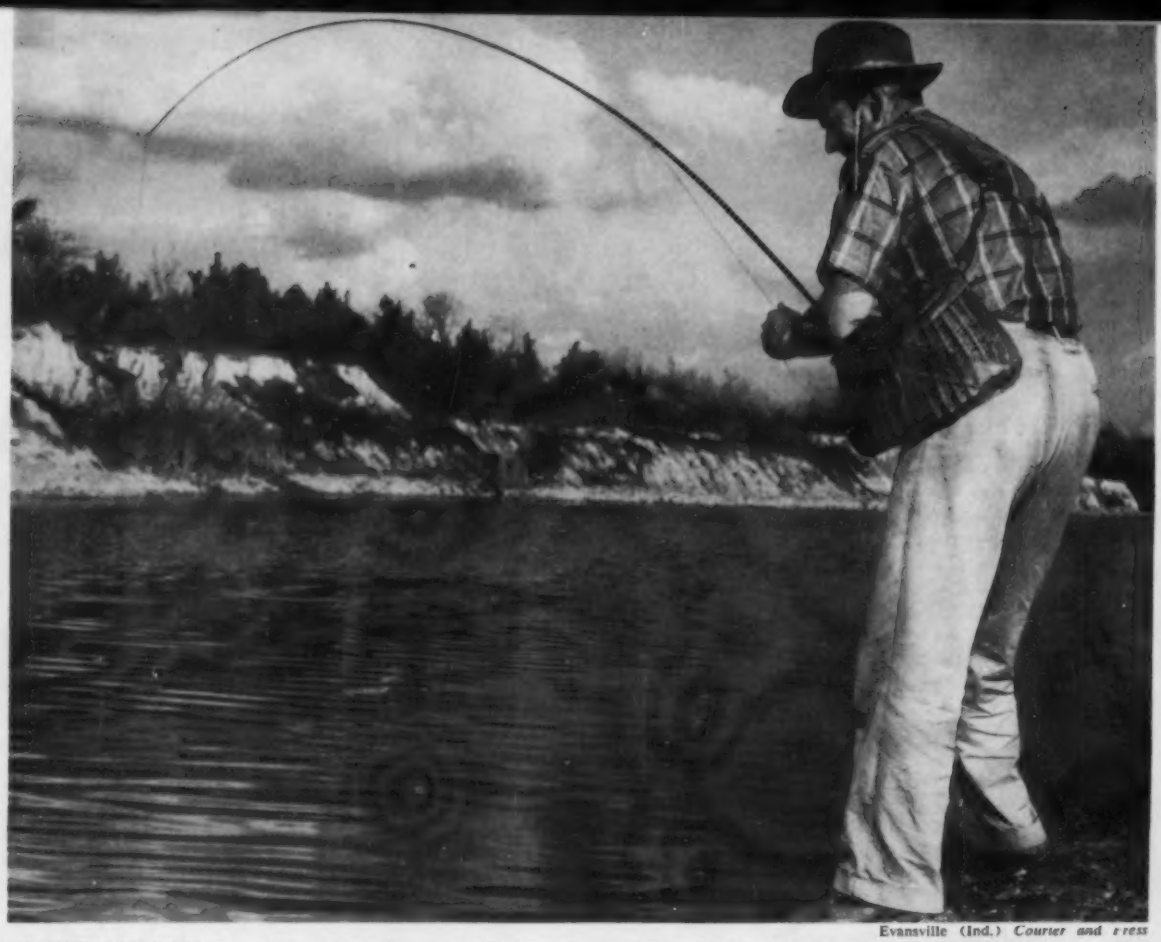
## SIMPLER APPLICATION

This system of controls is much simpler than many of the systems used in mining today based on time-study men spending the entire shift in one section studying the production at considerable cost in labor and then trying to interpret what they saw and timed. In a large mine the number of sections that can be adequately covered from the standpoints of performance and delays and their subsequent analysis depends upon the number of industrial engineers or timestudy men available. If they are busy making continuous time-studies of one kind or another, the engineers have little time left for anything else.

In comparison, by setting up a system that can be reported by the foremen and calculated by a competent secretary or analyst, the industrial engineers can then spend their time measuring work and variations in conditions. They can study equipment either on or off the job, thus continually improving standards and helping management find equipment most applicable for the job.

Once a standard is set up, both materials and labor can be accurately budgeted and more accurate forecasts made. Development and planning are aided by setting up hypothetical standards and budgets to fit the natural conditions expected. Projections can be analyzed in the continual search for still more efficient ones.

Standards enable a company to keep reducing the cost of its product, thus maintaining its economic position in industry. Without continual improvement, even a vigorous company gradually becomes weaker with respect to its competitors who continually search for ways to make a better product at less cost.



Evansville (Ind.) *Courier and Press*

**FISHING FOR BASS** in a strip mine lake—an achievement of public-spirited strip operators in Hopkins County, Ky.

# Recovering Striplands in Kentucky

**A veteran forester and reclamation expert reports on Kentucky's experience in building a multiple-use pattern for recovering denuded striplands. Vital parts of the pattern:**

- **Suit plantings to local area needs.**
- **Follow nature's vegetation plan.**
- **Seek mutual understanding between the operator, the landowner and the public.**

By JOHN M. CROWL, Executive Director
Kentucky Reclamation Association, Earlington, Ky.

Evansville (Ind.) *Courier and Press*

**THE AUTHOR** examines a game food seeding on strip mine lands, Hopkins County, Ky. Prior to joining KRA, Mr. Crowl was a forester with the U. S. Forest Service and Spent 4 yr as field director, Ohio Reclamation Service.

TODAY'S MAMMOTH STRIP-MINING SHOVELS have focused public attention on what should be done with the scars left on the earth's surface after the land has been stripped.

The first Western Kentucky mine, known as the "McLean Drift Bank," was located at Airdre, near Paradise, in Muhlenberg County. This mining was done from exposed seams and would rank as strip mining today. During World War I, modern strip mining was begun on a serious basis. During the years that the industry was growing, strip banks were left exposed and sentiment began to be

aroused at the unsightly scars left by strip mining operations. Many of the operators themselves made an effort to cover up the exposed land with plantings.

## NEED FOR KNOW-HOW

One of the main drawbacks to reclamation of the stripped lands was lack of knowledge about what to plant and when and where to plant it. Therefore, in 1948, a group of Kentucky coal companies formed the Kentucky Reclamation Association to bring together the know-how of the forester and the agriculturist to help in the job of planting and reclaiming the new lands.

At this time, there was still little known about what to do with overburden. This was truly new land—probably closely approximating the raw soil of the earth as it was millions of years ago.

Where the individual operator had been unable to accomplish much on his stripped lands so far as reclamation was concerned, the collective action of the association soon made itself felt. The experiments of the Central States Forest Experiment Station at Columbus, Ohio, were studied, and the cooperation of their field men was asked for and received. In 1948, Robert W. Merz put out the earliest experimental plots on land that had been stripped by the Sentry Coal Co. in Hopkins County. Other associations in other states were contacted. The knowledge and experience of each was exchanged and made available to the entire industry through the nationwide land and water-use committees of the National Coal Association and the American Mining Congress. Since conditions vary from location to location, it is necessary to adapt new information and to continue with research.

In the spring of 1955, the association established a small forest tree nursery to raise trees that were not obtainable from state and private nurseries. In this nursery, seedlings are raised from the seed of selected parent trees of good form and vigor.

With a firm background of forestry and reclamation already established within the staff of the association, the services of Frank W. Collins, a graduate biologist with experience in the fish and wildlife field, were obtained. The staff has continued to work with the Central States Forest Experiment Station in installing experimental plots and in studying the growth rates of various trees, game foods and grasses on the banks.

The work of the association is not completely in the field of planting and seeding. Legislative practices are studied and the association has worked closely with the Kentucky Div., Strip Mining and Conservation. Plans are made on the leased land of each coal company member, and the planting is done in compliance with the strip mine laws of Kentucky. Decisions on what to plant and where have to be worked out with the cooperation not only of the coal operator, but also with the owner of the land, and with state officials.

# Obligation . . .

**BIGGER SHOVELS** have brought rich rewards in stepping up strip production and in reducing mining costs; they have also deepened the obligation to consider reclamation as a legitimate part of operating expenses.

## ANALYZE AREA CONDITIONS

Many things are considered before plans are made about what to do with a given area. Spoil samples are taken into the association's testing laboratory where a chemical and mechanical analysis is made, including tests for sulphides, available nutrients, trace elements and soil percentage.

If the pH of the soil is such that it can be planted, then there are other and different things to take into consideration. Is there a pit nearby that will make a suitable lake? Some of the loveliest lakes in Western Kentucky have been made by impounding the water in the final cut of a strip mining operation. Many have been stocked with bass and blue gills, or with the shellcracker bream that the association is now experimenting with. Every possibility is explored in the areas to make them a place for recreation and retreat for the sportsman.

Some of the areas near roads and communities are better off graded because of the aesthetic value of the more rolling banks. This practice is avoided wherever possible, however, because of the compacting of the soils, making it more difficult to plant trees successfully.

It has been found that the black locust makes a fine nurse crop for stands of hardwood and coniferous forests that are being planted for the future. Not only does the black locust grow well, but it is a legume that returns to the soil a great deal of nitrogen, which helps in establishing a more permanent type of forest for the years to come. The locust is planted, along with pine and especially hardwoods, to cover the banks at a more rapid rate than if the hardwoods and pine were planted alone.

## FOLLOW NATURE'S PLAN

So that stripped lands can be used as soon as possible, nature's process of revegetation is followed closely. In nature, small trees and shrubs are generally the first plants that come into a stripped area—depending a great deal upon the type of surround-

Evansville (Ind.) Courier and Press

# Response . . .

**RECLAMATION EXPERTS** plant locust with pine and hardwood to obtain rapid and permanent cover of banks.

**CULLEN JENKINS,** president, Pine Valley Coal Co., Nortonville, Ky., raises game birds for revegetated areas.

ing growth. In planning the planting, consideration is given to the wildlife that will come first into an area that has been denuded of vegetation. It is known that rabbits and birds—quail, chukar, and pheasants—will thrive wherever there has been an effort made to provide them with cover and food. Therefore, the association generally plants game food and cover, along with trees, so that the future forest may have multiple use while growing a crop of trees.

From this idea of a multiple use of striplands, the association has built up an interesting sideline. One of the coal mine owners, Cullen Jenkins, of Earlington, Ky., has increased what was his interesting hobby into a major avocation of providing wild birds for stocking the newly-created range. Since chukar, a grouse-type bird that hailed originally from India, has found the dry ranges of the western states to be habitable, the association decided to try them out on the similar type lands in the coal fields of Western Kentucky. These birds seem to be taking to their new homes in fine style, and several families have left evidences of good growth near the areas where they were turned out.

Hundreds of quail have been released, and their growth pattern proves that the game foods planted have made a habitable home for them. Where game food is provided for game birds, other feathered friends find haven and the life of the future forest is greatly increased thereby.

## FACTORS VITAL TO SUCCESS

The speed and value of reclamation depends on several factors. First, much depends on how the raw lands were left, the rate the rock breaks down into soil sized particles, and the chemical composition. In some areas, the first crop of fence posts and Christmas trees can be taken in as short a time as 8 yr. This is good forestry practice, too, for as the trees are thinned out, the remaining stand of timber will have a better chance to grow straight and tall and become a valuable forest of saw timber.

A critical factor also is the amount of understanding that can be achieved between the landowner, the operator, and the general public. If coal is to be mined economically, reclamation must be a part of the legitimate expenses of the operation. An arbitrary specification by the landowner as to the type of reclamation, without consideration of the land-use capabilities, may be bad for the operator and for the industry as a whole. Frequently, reclamation done in one area may not be feasible or advisable in another area. When public opinion, for example, can be trained to wait for gradual breakdown of rock particles before planting is demanded, the overall costs of establishing forests on areas as a whole may be considerably reduced.

As another example, some owners would like their lands to be converted into pasture lands, such as has been done where the overburden consists of a high proportion of limestone rock. However, if this area consists of great heavy rocks, with a large instance of sandstone materials, it is completely unrealistic to expect the land to be converted to rolling pasture lands. Experience has shown that the major part of reclaimed strip-lands should be put into the growing of trees, with a multitude of uses in view.

Future reclamation practices will depend also on the research that is carried on now. Individual operators cannot afford the time nor the expense of research on what is best to plant. Ways must be found to improve planting methods and survival of the species. The association of coal operators, with all companies contributing to the expenses of experiments and research, is the answer to better land-use practices.

## RECLAMATION PROGRESS

At present the association is planting 27 different tree species on strip land. Fruit trees also do well in certain areas, and the fruit itself is of a delicious texture and flavor. Since the inception of the association in 1948, 6,985 acres have been reclaimed. In this area, 4,290,950 trees and game-food plants have been planted and 97,524 lb of seed have been sown. Survival has been good, considering the fact that the average has been taken from the beginning of the plantations. Average survival has been 65% of the total planting. As research continues and planting methods and knowledge improves, survival should extend up to 95%, as it is now averaging in many of the areas that have been planted recently.

While the forests are growing, the fishermen are proud of the catches they are getting in some of the beautiful, wooded stripland lakes; bird dogs are nosing through the food and cover patches in search of coveys of quail; and hunters are jealously watching the progress of the chukar, a gamey bird which is good eating. Also, deer are coming in. All these are contributing to the building of a pattern of multiple use forests which can be enjoyed by generations to come. And the final payoff: new prestige and public goodwill for strip operators.

**A CHANGE IN TRACK GAGE,** from 44 in to 48 in, means heavier locomotives hauling longer trips at a Hellier Coal & Coke Co. mine. This job, requiring the conversion of more than 4 mi of track, was done over a single week-end.

# You Can Change Track Gage

**Operating officials usually learn to live with the track-gage they have inherited.**

**Here is one mine where the advantages of changing the gage made it desirable to go ahead with the job of converting.**

TRACK GAGE in underground workings usually is considered an inviolate condition which must be lived with as long as the mine operates. But track gage is not a static natural condition; it can be changed if good and sufficient reasons exist for doing so. Proof of this was recently demonstrated by officials and workmen of the Hellier Coal & Coke Co., who over a single weekend changed the gage of more than 4 mi of track from 44 in to 48 in at a mine in eastern Kentucky. A controlling interest in Hellier Coal & Coke Co. was recently acquired by Blue Diamond Coal Co.

## WHY CHANGE THE GAGE?

The property is the former Allegheny No. 4 mine of the Hellier Coal & Coke Co., Hellier, Ky., operated in the 44-in Elkhorn No. 2 seam which contains valuable by-product coal.

Possibilities for more economical recovery of this coal led Hellier Coal & Coke officials to convert active sections to a trackless system as soon as the necessary equipment could be installed and the operators trained. However, it was decided to continue with track haulage outby the loading points. Having made these solid decisions, company officials then turned to a study of track gage and found these four valid reasons for changing:

**1. All major Blue Diamond properties** operate on 48-in gage. This includes the Leatherwood and Blue Diamond mines in Kentucky and mines in Virginia. The advantages of standardization were seen in the opportunities it provides for transferring locomotives and cars from one mine to another to smooth out production and to make it easier to schedule locomotive and car maintenance.

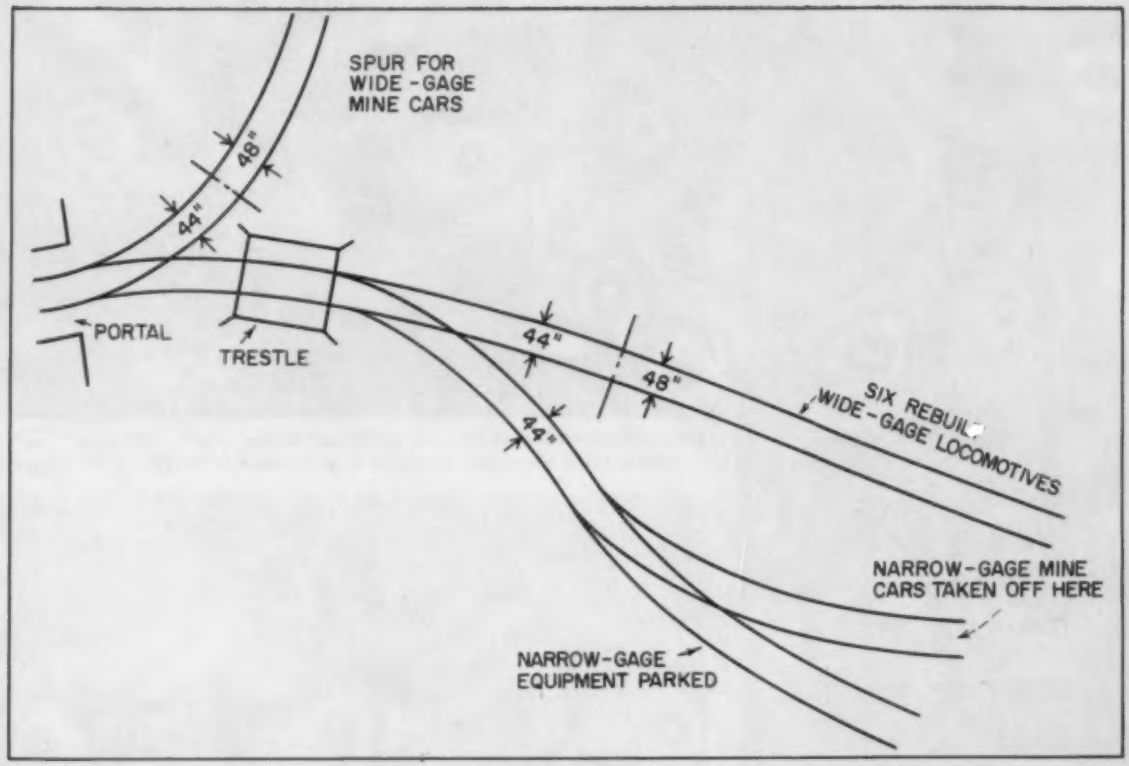
**2. Future life of the property** is sufficient to permit the change on a reasonable depreciation schedule.

**3. The job could be done** by company personnel.

**4. The 4-in change in gage** did not make it necessary to change curve radii. Furthermore, the required 30-in clearance between sides of the cars and the rib could be provided.

## WHAT THE JOB REQUIRED

A little more than 2 mi of the total trackage is laid with 60-lb rail and the




**THIS IS THE SETTING** devised by Hellier officials for handling track-mounted equipment. Narrow-gage equipment was hauled outside and wide-gage locomotives hauled wider cars inside after the change.

remainder with 30-lb. Widening the gage consisted of moving the outer rail (opposite the trolley-wire side) a distance of 4 in farther out. This means that on each curve a piece of rail had to be removed or added, depending upon the direction of curvature of the track.

Every switch had to be reset and required longer lead rails. Existing 6-ft ties were used if they were in serviceable condition. Worn ties were replaced with 6-ft 6-in ties, and the longer ties will be used for replacement from now on. Under switches, however, the 6-ft ties were replaced with the longer ones.

Steel ties are used with lighter rail, and a supply of these was distributed throughout the mine during the week before the change was made. In fact, all supplies, insofar as the need could be foreseen, were stocked in the mine. These included tools for cutting and drilling rail and extra rail bonds.

**The actual work began on Thursday at midnight** and was virtually completed on Saturday at midnight. Some finishing touches, at troublesome switches, for example, were made by a skeleton crew on Sunday. This schedule meant that only a single producing shift on Friday was lost.

R. T. Richards was appointed superintendent of the Hellier properties last Spring. Later on, Jack Hollan was appointed general mine foreman. The working force includes 90 men.

Work assignments were planned in advance by Mr. Hollan. Three mainline tracklayers each headed a crew of two or three helpers in resetting all switches. Straight-track crews included a foreman, a section tracklayer and four or five helpers. Section assignments were passed out to each of the crews defining the extent of their responsibilities.

## HANDLING ROLLING STOCK

First order of business was to lay a spur on 48-in gage outside the portal to receive six rebuilt locomotives which were delivered to the mine before the change was made. As soon as the producing shift on Thursday was completed the narrow-gage locomotives began to remove 130 mine cars, and track-mounted mining machines were brought out.

The 2-ton mine cars were hauled off the end of a 44-in spur to a storage area by a bulldozer, and the mining machines and locomotives were parked on another track to await final disposal. The layout is shown in the accompanying diagram on this page.

**Some of the older mine cars** had to be converted to a wider gage to fit the new track system. This was done by a welding contractor who set up his equipment near the end of the mine-car spur. He selected cars in good condition, cut out the old axles and replaced them with new longer axles. The converted cars then were hoisted onto the 48-in track in back of the rebuilt locomotives. As soon as the gage was adjusted at the portal area and inby, the wide-gage locomotives began to haul the cars back into the mine. Approximately 50 cars were converted and 100 of the wide-gage reconditioned cars were brought in from worked-out sections in Blue Diamond mines.

A major advantage resulting from the change lies in the fact that the wider gage accommodates heavier locomotives, permitting haulage of longer trips against adverse grades encountered on the main line. One of the rebuilt locomotives is a 13-ton unit, where the largest of the old units was 8 tons.

Gordon Bonnyman is president of Hellier Coal & Coke Co., with headquarters at Knoxville, Tenn. John Mayhew is operating vice president.

OVERBURDEN drilling is handled by truck-mounted rotary unit.

4-YD DRAGLINE teamed with bulldozer works in one pit. Dozer cleans out brush, helps move the overburden and makes a bench for the dragline.

COAL LOADING job is assigned to diesel-powered 1¼-yd shovels. Top of coal is scraped and swept with power unit before coal is loaded.

# Planned Flexibility Matches Changing Stripping Conditions

**Zacherl meets variations in conditions in hilltop stripping with small diesel-powered units. Major reliance is placed on big bulldozers in overburden removal in addition to dragline, shovels and rotary drill.**

VERSATILITY is the key to mountain-top stripping at the Zacherl Coal Co., in Clarion County, Pa. Zacherl couples small diesel-powered shovels and large powerful bulldozers to move up to 60 ft of tough overburden to recover a 48-in seam of coal.

Zacherl's two operations, providing coal for a new dense-media cleaning plant, are near the tops of hills where the Clarion seam outcrops at an elevation of 1,500 ft. Much of the coal is under 60 ft of cover and the company often takes the lid off mountain ridges to expose the 4-ft seam of coal. Most of the easily recoverable first-cut, or outcrop, coal has been removed. Consequently, mining is more difficult for Zacherl. The company, however, has been stripping in the Clarion area for 15 yr and has successfully met the challenge of new problems in the past.

Joseph P. Zacherl, who now serves as president, formed the company 15 yr ago. His two sons, Raymond and

**SECOND PIT** has shovel and dozer as a stripping team. Coal-loading shovel in the foreground is 1¼-yd machine.

**BULLDOZER** is a key earthmoving machine in each of the pits. Units push material into pit and to spoil area.

**COMPACT** preparation plant includes dense-media washing, crushing, screening, oil-treating and bin storage. Coal is loaded into railroad cars or trucks.

Eugene, have followed in his footsteps in the stripping business and are on the job every day keeping the operations running smoothly. Raymond is general manager in charge of all operations; Eugene is in charge of all maintenance and sees that all equipment is not only kept in top operating condition but also is kept neat, clean and painted. In fact, the machines look like new and it is difficult to tell the age of a machine by its appearance.

By using small diesel-powered equipment, Zacherl gets a high degree of flexibility so that methods can be adjusted readily to changing conditions. The company also prefers diesel equipment because it can be moved readily in the mountain country.

## DRILLING AND BLASTING

Overburden on the Clarion coal consists of shale and sandstone. The sandstone usually occurs in the middle of the overburden and often is as much as 50% of the material.

Zacherl uses a truck-mounted Winter-Weiss rotary dry-type Portadrill to sink vertical blastholes in the two pits. Using this machine only on the day shift, two men are able to drill enough holes to keep pace with the stripping machines.

Blastholes are either 4¾ or 5⅝ in, depending on the thickness and hardness of the rock. Holes are spaced 15 ft apart in rows on 17-ft centers. Holes in adjoining rows are staggered. Two rows of holes usually provide sufficient pit width for the stripping machines.

A separate two-man crew charges holes with Atlas 113C explosives which are detonated with delay caps. An average of 40 holes are detonated at a time and blasting is done two or three times a week.

## REMOVING THE COVER

Zacherl relies on big powerful bulldozers to remove a large part of the overburden in both pits. A P & H 4-cu yd diesel dragline works with a Caterpillar D8 bulldozer in one pit. An Osgood 2-cu yd diesel shovel and a Caterpillar D9 dozer remove blasted material in the other pit. All the machines work two shifts per day.

The bulldozers work ahead of the stripping machines in the blasted overburden, push the upper portion of the bank downhill into the pit, across the pit and up to the top of the spoil area. No definite portion of the overburden is assigned to be handled by the bulldozers. The dozer operators keep ahead of the stripping machines and help move as much of the dirt as possible. They make it possible for the stripping machine to perform more efficiently because they push much of the overburden into the pit where the stripping machine can handle it easier. They also push a large part of the material in the spoil bank to a point beyond the range of the stripping machines. Aside from moving a portion of the overburden, the bulldozers reshape and smooth the spoil areas when mining is completed. And they frequently are called on to do miscellaneous jobs, such as roadbuilding and cleanup work.

## LOADING AND HAULING

Coal is loaded only on the day shift at both pits. A Bucyrus 22B shovel with a 1¼-cu yd dipper loads coal in one pit and another Bucyrus 22B with a 1¼-cu yd dipper loads in the other. A fleet of hired trucks carries the coal between 5 and 6 mi to the Zacherl cleaning plant. Much of the road twists and turns through wooded mountains until it meets the state highway. The final leg of the haul is over the state highway to the plant.

**WASHING** of 4x¾ is done in dense-media unit that reduces ash and sulphur content. Clean coal leaves at center.

**RECOVERY** of magnetite for later reuse is achieved with this unit located under the clean-coal sizing vibrator.

**FINE COAL** in clean-coal underflow is recovered by combination of a cyclone and small vibrator with 1-mm screen.

**FOUNDER** of company, J. P. Zacherl (left), discusses problems with son, Raymond, general manager.

## DENSE-MEDIA WASHING

Five months ago Zacherl's new dense-media washing plant went into operation. With these new washing, crushing and screening facilities, the company now is able to provide customers with a uniform product having less ash and sulphur than before. In the past the company depended on hand-picking for removal of impurities.

The new plant fits into a compact building located between the highway and railroad tracks and is designed to permit loading either into railroad cars or trucks. Construction of the new plant was handled by the Interstate Engineering Co., Fairmont, W. Va. To provide customers with a still better product, a Brown-Fayro oil-treating system was installed in January of this year.

Trucks discharge into a 50-ton bin located east of the main cleaning plant. From there the coal is fed into a crusher by a Syntron feeder and reduced to 4" in top size. The crusher product falls onto a 24-in belt that elevates and conveys it to the top of the cleaning plant. Minus ¾-in slack then is screened out by two Link-Belt vibrators operating in tandem. The second vibrator is a wet unit that washes off any remaining fines before the coarse product enters the dense-media washer.

Clean 4x¾ flows over an Allis-Chalmers Low Head vibrator it is dewatered and magnetite is recovered. From this point on, the clean coal may be handled several ways. It may be sent to a Scottdale double-roll crusher and then discharged onto a Parrish-type shaking screen for sizing into 2x1¼, 1¼x¾ and ¾x0 fractions. It may be crushed and loaded as nut and slack or it may be loaded directly as 4x¾ without crushing.

After it is sized on the vibrator, the clean coal drops into 100-ton storage bins for loading into railroad cars or trucks. The raw ¾x0 drops into a 100-ton bin as it is removed from the run-of-mine coal. It is hauled directly to a customer by truck.

Magnetite and water from the dewatering vibrators flows to a sump and then is pumped to the magnetite-recovery center where a Memco unit removes the magnetite for reuse. Fine coal plus water remaining from the magnetite-recovery circuit is pumped to a cyclone where solids are concentrated. The concentrated coal drops onto a Syntron vibrator for final dewatering before it passes to the ¾x0 bin. The company thus is able to recover valuable coal that otherwise would be lost.

# Want to strip more overburden–faster?

## Allison Engineering Co. uses a Turbocharged CAT* D9 Tractor with No. 9S Bulldozer on its Sligo, Pa., operation!

Look at the load on this D9's blade! Pass after pass this giant moves big yardage for Allison Engineering Co. Production here averages about 450 tons of coal a day. The D9, working ahead of a 3-yard dragline, strips 9 yards of overburden in the same time the dragline makes a complete swing. With typical Caterpillar dependability, it's on the job steadily 16 to 20 hours, 6 days a week.

Everything about the giant D9 is engineered for big production. It balances 320 flywheel horsepower with 35-ton heft to roll big loads ahead of the blade. Its Turbocharger, driven by the engine exhaust, packs air into the engine according to engine load, not engine speed, for more working power. Hydraulic boosters provide easy steering, braking and master clutch use. Its single lever control starting system provides sure starts. And the D9 is easy to service. For example, oil clutch, torque converter, transmission and steering clutches each can be removed individually without disturbing other components.

For bigger production at lower costs, there's no tractor built that can match the D9. To meet your needs, it's available with torque converter or direct drive with oil clutch. Want a firsthand picture of how the D9 can step up your production? Just name the date—your Caterpillar Dealer will gladly demonstrate on your job.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

**CATERPILLAR***

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WANTED—
THE HARD WORK

COAL AGE

# FOREMEN'S FORUM

## Short Quiz for Foremen

**Put on your "thinking cap," take pencil and paper and see how many of the following problems you can solve correctly. Read the problems carefully and check your arithmetic as you go along. You will find space for your answers, and our answers with a rating scale, on p 88. The time limit is 90 min.**

1. **How many tons of air** are moved in 8 hr by a fan that is passing a volume of 52,000 cfm? (Assume that 13 cu ft of air weigh 1 lb.)

2. **What is the linear speed** of the blade tips of a 6-ft fan which rotates at 720 rpm?

3. **What is the volume, in cubic feet,** of a mine car body that is 10 ft 6 in long, 3 ft 9 in wide and 27 in deep?

4. **What amount of water,** in gallons per minute, is passing through a 6-in pipeline if the stream moves at a rate of 7 ft per sec? (Disregard pipe friction.)

5. **The formula for determining** the size of copper wire needed for any given service is as follows:

$$CM = \frac{I \times D \times 21.6}{L}$$

where CM is the circular-mil size of the wire; D is the distance in feet; I is current in amperes, and L is the loss in volts.

What is the voltage loss in a 500,000-circular mil feeder line which is 2,500 ft long and carries a current of 500 amp?

6. **How much dirt,** in cubic yards, must be removed in digging a pipeline trench 300 ft long, 18 in wide and 4½ ft deep?

7. **Two mechanics drive away** from the main shop in opposite directions to answer emergency calls. The one going west drives at 20 mph and the one going east at 35 mph. At the end of 5 min the man going west turns back to return to the shop to pick up a tool he had forgotten and it takes him 5 min to find it and start out again. How far apart are the two mechanics at the end of 25 min?

**Reference Factors You May Need . . .**

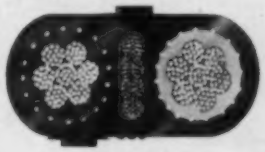
**A gallon weighs 8.3 lb**
**A gallon contains 231 cu in**
**One horsepower equals 746 watts**
**A cubic foot of water weighs 62.5 lb**
**$\pi$ (pi) is 3.1416**

Parallel Duplex (Flat Twin) Mining Machine Cable—600 Volts
(Ungrounded or grounded)

Single-Conductor Locomotive Gathering Cable—600 Volts

Portable Power Cables—Two, Three and Four Conductors
(Ungrounded up to 3,000 Volts, or grounded up to 5,000 Volts)

Three-Conductor Mine Power Feeder Cable
(Shielded with ground wires up to 10,000 Volts)



**Rome's shuttle car cable can't be damaged by bending**

The rugged Neoprene jacket forms a resilient web between insulated power conductors and ground conductor for maximum impact resistance. The open braid on each conductor firmly interlocks conductors to the sheath as a sturdy integral unit. A greater number of finer strands in power and ground conductors—plus a closely woven fibrous covering around the ground conductor (to minimize mechanical working of the fine strands)—increase over-all flexibility. These two features, together, prevent the damage that constant flexing, twisting, and tension might otherwise cause.

*Vulcanized in lead for extra toughness*

# Rome 60 mining cables are built for rugged duty, both above and below ground

These tough Rome cables have a much longer service life than ordinary cables. This is of dollars-and-cents importance to you because it can mean less down time, reduced replacement expenses, and increased production.

Here are some of the construction features that make Rome 60 cables your best mining cable buy:

**Conductors.** All conductors are of finely stranded copper wires for maximum flexibility.

**Insulation.** A long-aging, heat- and moisture-resistant rubber compound permits operation at 75° C., thereby providing overload protection. For high-voltage service, an ozone-resistant insulation is used.

**Reinforcements.** On Rome 60 portable cables, a heavy reinforcing open braid locks the Neoprene jacket to the inner construction to prevent failure from twisting, pulling, flexing and sheath separation.

**Jacket.** Neoprene vulcanized in a continuous lead mold provides durability and high resistance to abrasion, acids, oils and flame. All Rome 60 mine-trailing cables are surface-molded "P-105 BM" indicating full compliance with Federal and State of Penn. safety codes.

Specify Rome 60 mining cables for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 176, Rome Cable Corporation, Rome, New York.

**ROME CABLE**
CORPORATION

**8. A horizontal cylindrical tank, 6 ft** in diameter and 10 ft long, is half full of water. What is the weight, in pounds, of the water in the tank?

**9. How many gallons** of water are contained in the tank?

**10. What is the total cost** of this list of supplies?

850 roof bolts @ $1.35 ea.

15½ dozen rolls of electrical tape @ $1.05 per roll.

140 machine bits @ $1.28 ea.

7 dozen electric lamps at $3.42 per doz.

40 pairs of leather work gloves at $15.95 per dozen pairs.

**11. What is the total power cost** for operating a 75-hp motor for a period of 21¾ hr, if the average unit cost for power is 1¾¢ per kwh?

**12. A 6-in driving pulley,** rotating at 90 rpm, drives an 18-in pulley. What is the speed, in rpm, of the larger pulley? What is the linear rim speed in ft per min, of the larger pulley?

**13. An 8-ft-long bar** is set up as a lever with the fulcrum 2½ ft from the load end. What force would have to be exerted at the other end to raise a 220-lb weight?

**14. Four mines operated by a certain coal company** contribute to the total production of the company, as follows: Mine A, 23%; Mine B, 12%; Mine C, 47%, and Mine D, 18%. Mine B produces 850 tpd. How many tons per day does each of the other mines produce?

**15. Assuming an average cost of rough lumber to be 9¢** per board ft, calculate the total cost of this shipment:

42 2x4's, ea 16 ft long,
80 ft of 1x8,
17 2x6's each 12 ft long,
2 2x12's, each 8 ft long.

**16. The distance between two substations,** as measured on a 400-ft per inch mine map, is 13¼ in. What length of two-conductor communication cable (No. 14 wire) would be required to connect the two substations, figuring 3% excess for lead-ins, terminations and so on?

**17. Two 8-ton trucks haul coal** from a loading shovel (2½-ton bucket) to a cleaning plant 2 mi away. Both travel at an average speed of 34 mph. One morning, the shovel operates steadily on a 45-sec cycle for a full hour. How much coal did the trucks haul away from the shovel during this hour?

**18. A certain flat-bed trailer** has a maximum carrying capacity of 30 tons. Can this trailer, without overloading, transport enough 90-lb rail to construct 1,200 ft of track in the main haulageway?

**19. The feed conveyor** into a preparation plant discharges onto a primary sizing screen which makes the following separation: 70 tph is plus 4-in material; 35% of the screen product is 4x2-in material, and 40% is minus 2 in. How much feed does the plant receive in a 7¼-hr shift?

**20. Assuming coal weighs 95 lb per cu ft** in the solid seam, how many tons would be produced from a 9½-ft-deep cut in a 16-ft-wide place in a 54-in seam?

## Enter your quiz answers here . . .

| | |
|---|---|
| 1. _____ | 11. _____ |
| 2. _____ | 12. _____ |
| 3. _____ | 13. _____ |
| 4. _____ | 14. _____ |
| 5. _____ | 15. _____ |
| 6. _____ | 16. _____ |
| 7. _____ | 17. _____ |
| 8. _____ | 18. _____ |
| 9. _____ | 19. _____ |
| 10. _____ | 20. _____ |

RATING FORM:

18 to 20 correct—**Genius**
15 to 17 correct—**Excellent**
10 to 14 correct—**Good**
Less than 9 correct—**Only fair**

## Quiz Answers:

1. 900 tons.
2. 13,572 rpm.
3. 88.6 cu ft.
4. 765.8 gpm
5. 54 volts.
6. 75 cu yd.
7. 18.3 mil.
8. 8,885.6 lb.
9. 1,064.5 gal.
10. $1,399.05.
11. $21.30.
12. 30 rpm; 141.4 fpm.
13. 100 lb.
14. Mine A, 1,629 tons; Mine C, 3,329 tons; Mine D, 1,275 tons.
15. 866.36.
16. 5,459 ft.
17. 200 tons.
18. No. (36 tons of rail are required.)
19. 2,030 tons.
20. 32.5 tons.

# "Keep Your Mind on the Job"

Here is a safety hint, from The Union Pacific Coal Co. *Safety Review,* which you can pass along to your men.

"SEVERAL YEARS AGO a pilot from Louisville, Ky., was flying an airplane at a low altitude when he saw a pretty gal he thought he knew.

"He waved at her. She waved back. Pleased but distracted, he flew into a tree top and a power line, and finally cracked up in another tree top. He shinnied down, hurried to the girl to assure her he wasn't hurt. Guess what? She wasn't the girl he thought she was, but a total stranger!

**"Moral: When you don't keep your mind on the job, you may end up a total wreck—and still not get the girl!**

"Whether flying or driving, distractions such as pretty girls can cause trouble. Check yourself. Are you the type of driver who is easily distracted?

"Do you get interested in scenery, billboards, the latest model cars and people on the sidewalks, or do you keep your eyes on the road?

"Do you reach for packages, light a smoke, or look up addresses while driving, or do you stop before you do these things?

"And distractions have caused plenty of accidents on the job and in the home, too.

"There's the workman who watched the window washer instead of his own punch press.

"And there's the housewife who burned herself when she 'got lost' in a TV soap opera and forgot about her hot iron.

**"Now, just as a wandering eye can lead to a smashed car, a mangled finger or a scorched hand, a wandering mind can lead to serious injuries.**

"Whenever your mind wanders, whether it be pleasant memories of the past or anxious worries about the future —it takes you away from the job at hand.

"'The eye is blind if the mind is absent,' says an old proverb. Your eyes are merely windows for your mind to look through, and you sure need those windows when you're dong any job—but especially when you are driving or working around machinery.

**"Help cut the accident toll—keep Your Mind on the Job!"**

*To withstand this kind of punishment...*

# Allegheny River Mining Company chose Rome's extra-tough shuttle car cable

**No Damaging Bend**—Just a *Flip-over.* When flexed in use, Rome's duplex flops over and bends on its minor axis. Its interlocked construction forces the change and causes a flip-over, *not* a breakdown. This means that obstructions on the floor of your mine can't put damaging wrong-way bends in this tough cable.

To avoid cable breakdown under severe operating conditions—such as might be encountered in the expedient temporary tie illustrated above—the Allegheny River Mining Company relies on Rome 60 parallel duplex cable.

Here's a cable you can scrape, twist, soak, crush, or bend—Rome's shuttle car cable is built to withstand tough mine hazards.

**New integrated design**

A rugged Neoprene jacket and the braided conductors are *meshed* together, providing built-in protection against conductor slipping. Greater flexibility arises from an increased number of strands in the ground conductor and power conductors. And a closely woven fibrous covering on the ground conductor minimizes the mechanical working of individual strands.

The sheath, web, power conductors, and ground make up one integrated unit. No matter how you twist or flex this rugged cable, the sheath won't separate from the conductors.

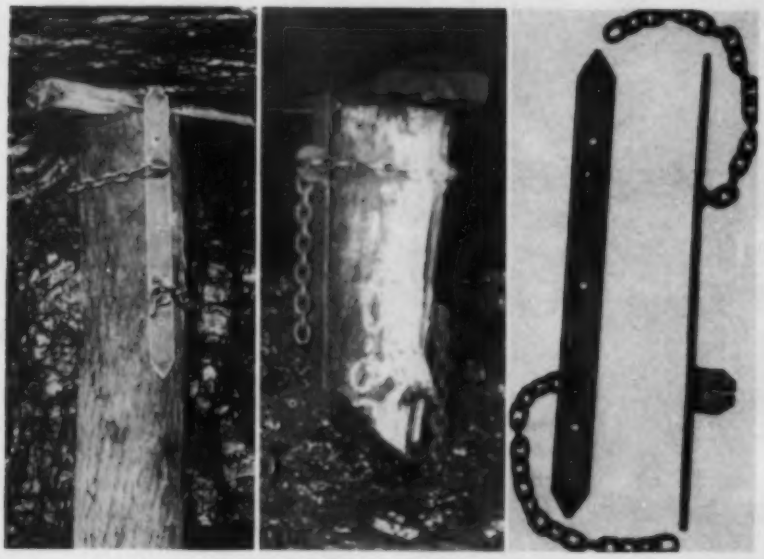
**Free sample**

Put a two-foot sample length of Rome's shuttle car cable to your toughest test. Prove to yourself that it's the most rugged, most dependable you can buy. Ask your nearest Rome Cable representative for your free sample—or write to Department 508, Rome Cable Corporation, Rome, New York.

**ROME CABLE**

CORPORATION

# OPERATING IDEAS



## Safety Device Prevents Dislodgment of Props

A SAFETY DEVICE to prevent the dislodgment of props during blasting is being tested by The Hudson Coal Co., Scranton 1, Pa., which reports that experiments to date indicate that the device has good possibilities in eliminating the prop-dislodgment hazard. The device, which is made of scrap metal and chain, is a modification of a design originated by the U. S. Bureau of Mines.

Hudson's installation procedure, as reported in its *Safety Commentator*, is to dig out a shallow hole or hitch in the bottom for the prop to set in. The prop then is installed with a cap piece which is pointed in the direction from which the flying material will come. After the prop has been set, holes are drilled or picked 1 to 2 in deep into the roof on each side of the cap piece. The ends of the plates are placed in the holes and the plates nailed to the props with 8D or 10D nails. The top chain is fastened first and if necessary tightened with wedges. Next the bottom chain is fastened in the same manner.

Hudson officials also are experimenting with making the device out of two scrap iron bars about 1 in in diameter and 20 in long with two nail holes in each bar. This version uses only one loose chain with a hook on one end and a ring on the other wrapped around the prop near the lower end of the bar. After the chain is hooked it is tightened with a wedge.

The equipment required for a working place consists of enough plates to secure the last two or three rows of props at the face. As the place advances or retreats the plates farthest from the face are removed and placed on the new props. In the case of retreat mining, if roof pressure is constant the device is removed as soon as the condition of the cap pieces indicate prop dislodgment would be remote. The device could also be used to prevent three-piece timber sets from dislodgment. Aside from the safety factor of eliminating the hazard of working under unsupported roof until material is moved and props restored, there also is a labor saving device since the prop is only stood once.

## Tips on Brake Maintenance for Earthmoving Equipment

IMPROPERLY adjusted brakes are dangerous, cause excessive operator fatigue, waste time, cause unnecessary expense and down time. These undesirable conditions may be eliminated by checking the following items, which appeared in the *Allis-Chalmers Reporter*.

### GENERAL

1. A lot of brake trouble is caused by improper adjustment. Check the operator's manual for correct procedure and adjustment specifications.

2. Dirt, grease or oil on the lining as a result of grease or oil seal leakage will cause the brakes not to hold. This condition can be corrected by washing the lining. If the lining is so badly soaked that washing will not correct the trouble, then a new lining must be installed.

3. Do not ride the brakes. A good operator will have his foot on the brake only when turning or stopping.

4. Replace worn brake lining before the rivet head starts wearing into the drum. A scored drum should be replaced or turned on a lathe to obtain maximum contact between the drum and lining.

5. After installing new brake bands, check for proper setting. The initial adjustment is of utmost importance to insure long brake life.

### MECHANICAL BRAKES

1. Be sure to completely engage the steering clutch before depressing the brake. Turning with the steering clutch partially engaged and brake applied causes slippage in both the steering clutch and brakes. The result is excessive heating which is conducive to rapid wear.

2. Check linkage to see that rods are straight and not binding on any part of the frame or floor assembly. A bent or rubbing rod may cause the brake pedal to hang up or work hard.

3. Check the brake-band end pin for proper return into the brake lever bracket after release. Correct adjustment is impossible unless the pin is straight and returns properly.

### HYDRAULIC BRAKES

1. A spongy feeling brake pedal indicates air in the hydraulic system. The air must be bled off to correct this situation. Low fluid level in the master cylinder may be letting air into the system.

2. If the pedal does not give a solid feel underfoot, and slowly goes to the floor, check for a fluid leak in the lines, master cylinder or wheel cylinders.

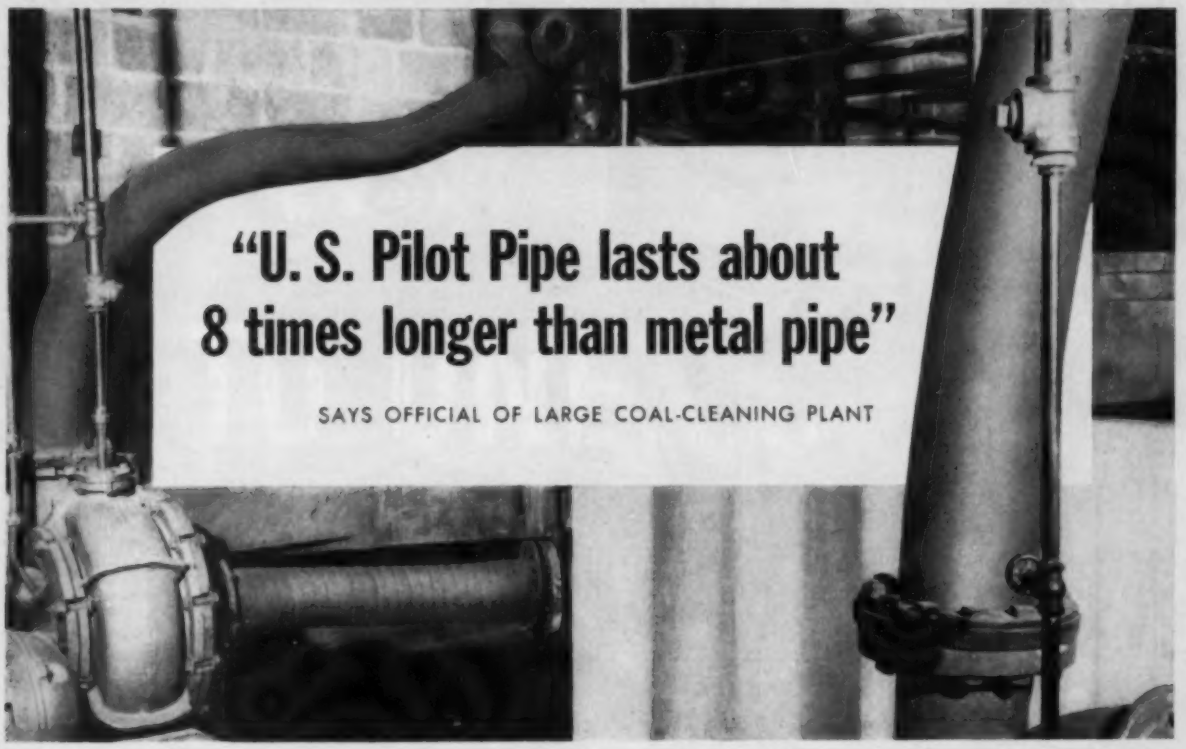
### AIR BRAKES

1. Check for and repair air leaks to insure enough pressure at all times.

2. Periodically check tractor and tractor protection valves to assure operation in case of emergency.

3. Trailer brakes should not be used alone except under certain conditions to avoid "jack-knifing" of the unit.

PILOT PIPE



# "U. S. Pilot Pipe lasts about 8 times longer than metal pipe"

SAYS OFFICIAL OF LARGE COAL-CLEANING PLANT

A large Eastern anthracite producer uses over 600 feet of U. S. Pilot Pipe to handle one of the most punishing jobs any pipe is ever called upon to do. This pipe is in the coal-cleaning plant where it has to circulate water containing solids (silt, sand, pyrite, refuse). These exert a severely abrasive action on the pipe. Yet, after 6 years of use, the U. S. Pilot® Pipe shows no sign of wear! Officials of the mine say U. S. Pilot Pipe *outwears metal pipe at least 8 to 1.*

U. S. Pilot Pipe is so flexible that no elbows or short connections are needed. Together with pinch valves it safeguards equipment from the mechanical strain caused by vibration, expansion, contraction and "water-hammer". Available at any of the 28 "U. S." District Sales Offices, or selected distributors, or write us at Rockefeller Center, New York 20, N. Y.

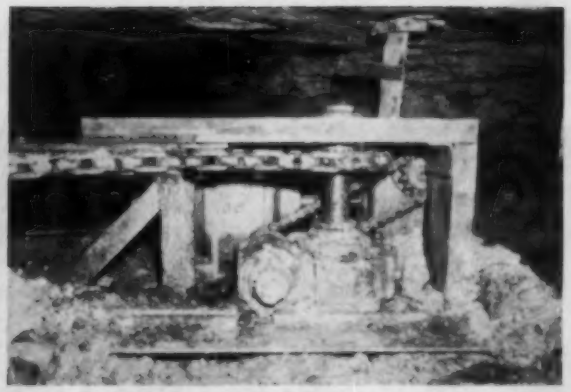
In Canada, Dominion Rubber Company, Ltd.

Closing valve on section of U. S. Pinch Valve Hose to control flow of abrasive water in preparation plant. Mechanism is compactly designed, can be refitted to new pinch valve bodies.

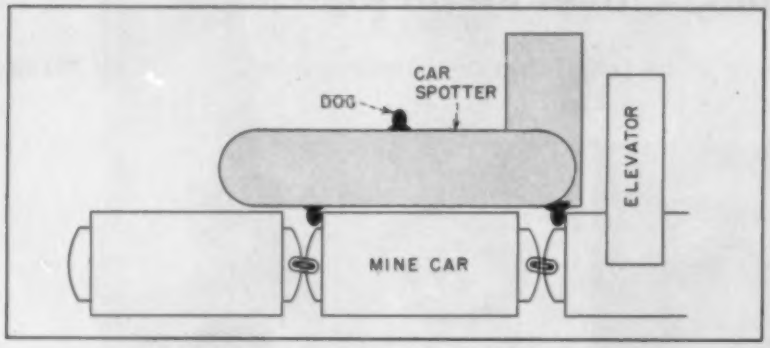
Mechanical Goods Division

**United States Rubber**

**SLED-LIKE CONSTRUCTION** of the bottom pan of the car spotter permits easy moving to the next setup.



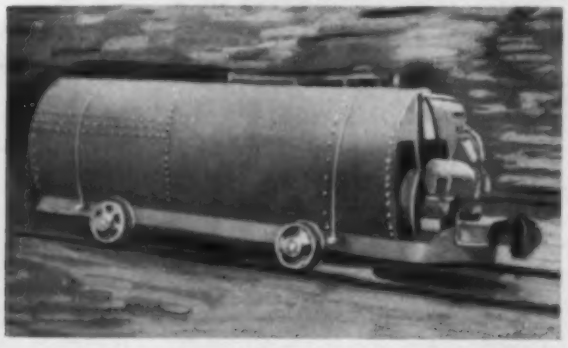
**DRIVE UNIT** of the car spotter includes 10-hp motor, reducer and transmission gear case.

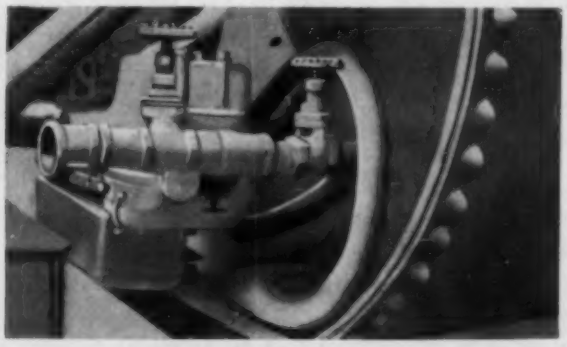



**TYPICAL LAYOUT** of a loading point using the car spotter.

## Car Spotter Uses Cutterbar and Chain

FEATURED in the design of a car-spotter are forward and reverse operation, self retarding and low cost construction. Devised by L. R. Fraley, assistant to the president, and D. J. Nunan, chief engineer of the Omar Mining Co., Omar, W. Va., the car spotter was built from old parts on hand at the mine. Parts include: one 10-hp Westinghouse motor, one 10-hp Cleveland speed reducer, one 14BU Joy transmission gear case, two Goodman cutter bars and chains and necessary metal for frame work. The motor and reducer are joined by a disc coupling. The reducer and transmission gear case are connected by a drive chain. The gear case, which is the last stage of the reduction, drives the cutter chain. The two cutter bars are welded together, end to end. The chain has three equally spaced dogs to engage each car as it approaches the loading point. The bottom pan of the car-spotter is constructed in a sled-like manner to permit easy moving. For forward and reverse operation a reversing switch is necessary. The spotter must be anchored from both ends for dual operation. Self retarding is achieved through the gear reduction. The time consuming job of changing the hoist rope is eliminated. The over-all length of the car-spotter is 25 ft. Spotter can handle from 45 to 50 4-ton cars without overload. Feed is 52 fpm. Car runaways are at a minimum since the chain is stronger than the wire rope usually employed.





## Portable Water Tank Made From Scrap

A 1,100-GAL portable water tank was added to the fire-fighting equipment at Eatern Gas & Fuel Associates' Wharton No. 2 mine, at no cost other than the labor of assembling. The 4x12-ft tank had been in the scrap pile for several years. The trucks, frame, metal, pipe valves starter switch, pump and 1½-hp motor were on hand and could be spared to make the unit.

Water is discharged through 150 ft of 1½-in fire hose which is racked on one side of the tank. The pump will throw a stream about 30 ft. Arrangements of the valves permits water to be pumped from the tank or a sump, or the pump will pick up water and fill its own tank.

So far the company hasn't needed the tank to fight fire but it has been used to wash the concrete floor of the foremen's office and lamp house.

# TWO TO ONE.....

....you never made a quicker splice!

Now you can add or remove an entire section of cable in a minute!

Join same or different size cables from 4/0 to 1,000,000 cm by turning two cap screws!

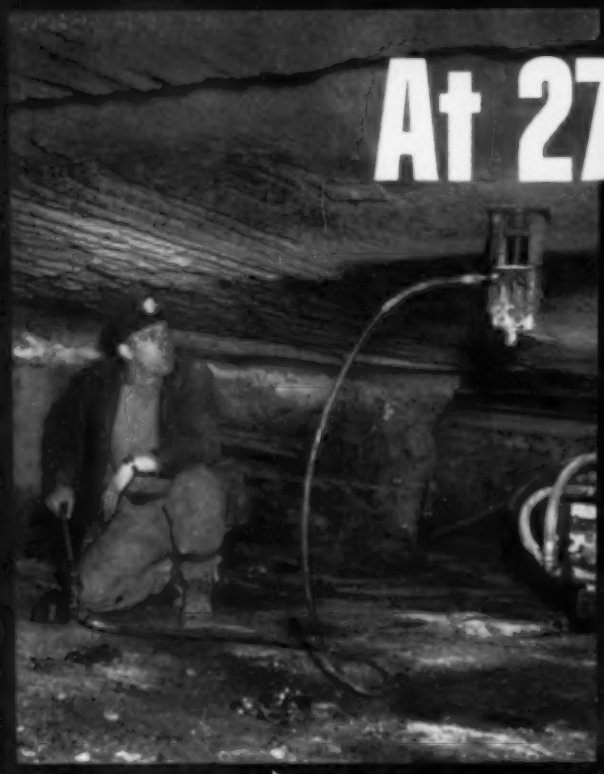
Extend feeder, tap off machine cables, make switch or panel connections with a speed and ease never before possible! When you leave the twin halves of these O-B "Cap Screw" Connectors permanently attached to your cable ends, you have a "built-in" connection ready and waiting wherever and whenever you need it. High strength, high current carrying capacity. Smooth, slim contours tape easily, drag over rough bottom without snagging. Write for more information today.

**Ohio Brass**

**MANSFIELD OHIO, U.S.A.**

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

# At 27,000 pounds.



At 27,000 pounds tension, a ¾-inch high strength roof bolt snaps like an overstretched rubber band. Because O-B shells and plugs consistently support extreme test loads like this, they contribute an extra margin of safety to any bolting program.

O-B "pull test" is a practical demonstration of the holding power of O-B shells and plugs at any given location. Here, twin rams are fastened to head of an installed ¾-inch high-strength bolt in order to load the bolt far above normal tension of 9,000 to 10,000 pounds.

Pressure gage attached to pump allows bolt tension to be read accurately throughout test. In this picture, taken seconds before the bolt broke, gage shows tension of almost 27,000 pounds.

Ohio Brass

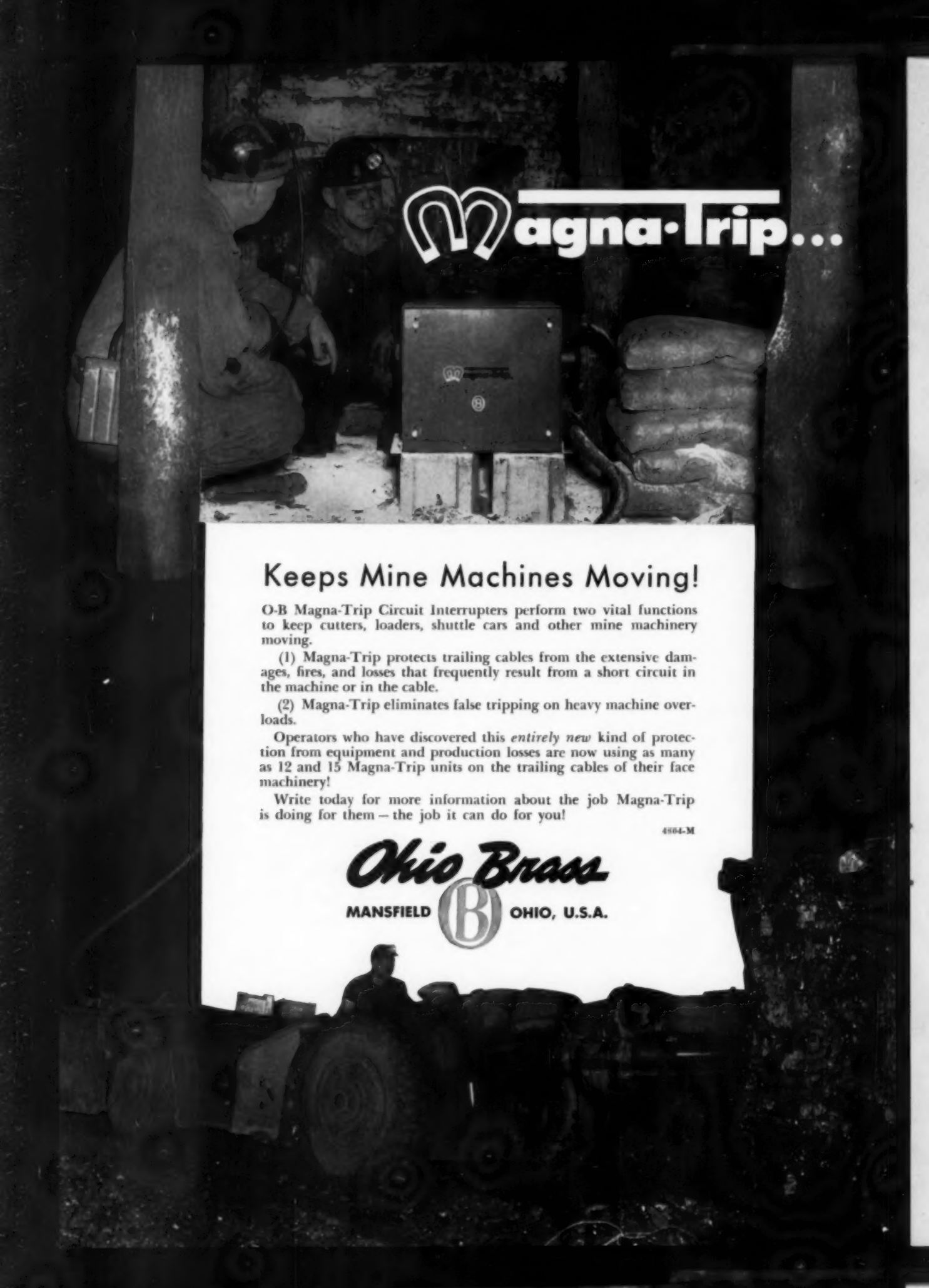
# ...KAPOW!

O-B

shells and plugs

Bolt breaks at ultimate load of approximately 27,000 pounds. Photograph shows test equipment which fell to bottom as the bolt snapped.

Close-up shows how bolt stretched and "necked-down" before breaking. O-B expansion unit stayed put throughout the test, proving that in this particular roof its holding power exceeds the strength of the bolt. Pull tests like this one have proved time and again that O-B shells and plugs "go up easy and stay put" almost anywhere!




## Keeps Mine Machines Moving!

O-B Magna-Trip Circuit Interrupters perform two vital functions to keep cutters, loaders, shuttle cars and other mine machinery moving.

(1) Magna-Trip protects trailing cables from the extensive damages, fires, and losses that frequently result from a short circuit in the machine or in the cable.

(2) Magna-Trip eliminates false tripping on heavy machine overloads.

Operators who have discovered this *entirely new* kind of protection from equipment and production losses are now using as many as 12 and 15 Magna-Trip units on the trailing cables of their face machinery!

Write today for more information about the job Magna-Trip is doing for them — the job it can do for you!

4884-M

**Ohio Brass**

**MANSFIELD OHIO, U.S.A.**

**BOSTON**
*concord yellow jack*
**AIR HOSE**

This is the hose built to take the most brutal treatment. So strong it snaps back even after being battered by a loaded Model LLD Euclid — a gross weight of 203,300 pounds!

When you consider that 45% of air hose failure is caused by *external* conditions, Boston Concord Yellow Jack is definitely the air hose to choose for your toughest jobs. It has the stamina to handle repeated rugged impact . . . the strength to withstand the highest internal pressures.

Boston Concord Yellow Jack's bright yellow cover makes it easy to identify.

Whatever your hose needs, there's a BOSTON Hose for you . . . and a BOSTON man nearby to help you solve your problems.

**BOSTON** BOSTON WOVEN HOSE & RUBBER CO.
BOSTON 3, MASSACHUSETTS

**Big production:** at the Camp Dennison, Ohio, plant, a 2¼-yd. Michigan loads out a heaping bucket load of frozen aggregate. Power-shift transmission is standard equipment—cuts seconds off every cycle between truck and pile.

## $76,000* buys *one* 2¼-yd. truck crane or *four* 2¼-yd. Michigan Tractor Shovels . . .

# Here's why Ohio Gravel Co. bought the four Michigans

Ohio Gravel Company operates five plants around the perimeter of Cincinnati. Until a short time ago, ½-yd. and ¾-yd. clamshells and shovels handled all loading from stockpiles. When it became apparent that the Miami plant (300 t.p.h. capacity) did not have adequate loading capacity, Ohio Gravel asked for bids on a special 2¼-yd. mobile crane. According to Walter Flach, V. P. Production, they recognized the need for bigger bucket capacity and better mobility between stockpiles. Bids on the crane ran from $65,000 to $76,000—a substantial price to pay for increased capacity in *only one of the five plants.*

### Had to leave the demonstrator

At this point Bode-Finn Co., the local Michigan distributor, got permission to demonstrate a 2¼-yd. Michigan Tractor Shovel at the Miami plant. The "demonstration" lasted two weeks—that is, Ralph Hautman (Miami superintendent) wouldn't

*Current list price F.O.B. factory for four 2¼-yd. diesel Michigan Tractor Shovels.

let them take the demonstrator away until a permanent machine was delivered. Before the new Michigan even arrived, Ohio Gravel Company bought three more for other plants. *The total cost of the four Michigans was approximately the same as the one crane.*

## Loads as much as two cranes

At the four plants with Michigans, the superintendents agree that one Michigan loads trucks as fast or faster than two ¾-yd. clamshells. With widely separated stockpiles, the Michigans move around the yards as fast as the incoming trucks—27 mph top speed. They consistently get heaping bucket-loads. Power-shifted cycles between pile and truck average about 40 seconds; it takes 4 minutes or 6 bucket-loads to put 19 tons into a dump trailer (see picture).

**A typical heaping bucket-load** of graded bank run comes up well over the 2¼-yd. rated bucket capacity. Digging bank run, the Michigan handles approximately 5½ tons per bucket-load.

**Handling clean-up work** in its spare time, the Michigan eliminates stockpile contamination. Unlike the clamshells which formerly handled the job, the Michigan does not pick up dirt as it cleans up around the piles.

## More profits for producer and trucker

Faster travel, faster cycles, bigger bucket-loads obviously make more profits for producer and trucker alike. Ohio Gravel Company recognized this fact when the first Michigan was demonstrated. Your own Michigan distributor will give you this same kind of proof. A chance to demonstrate is all he asks—*you name the job.*

Michigan is a registered trade mark of

CLARK® EQUIPMENT

**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**
**2473 Pipestone Road**
**Benton Harbor 18, Michigan**

**It took four minutes** to put 19 tons of material into this dump trailer. Six bucket loads filled it. Note that the 2¼-yd. Michigan has plenty of dumping clearance over the 10-ft. high side boards. Even with batch boards in place, the Michigan has no trouble.

Front view of the Jeffrey Colmol at Enoco Collieries, Vincennes, Indiana, shows Kennametal Taper-Shank Bits in the outer position holders.

# New Kennametal* Taper-Shank Bits pay dividends at Enoco Collieries

**THE PROBLEM:** Enoco experienced rather high bit costs on Colmol mining the tough Indiana #5 Seam. The bits in the outer holder positions on the Colmol arms were largely responsible. It is in these positions that bit velocity is greatest and bit punishment most severe. How to cut bit costs and maintain high production?

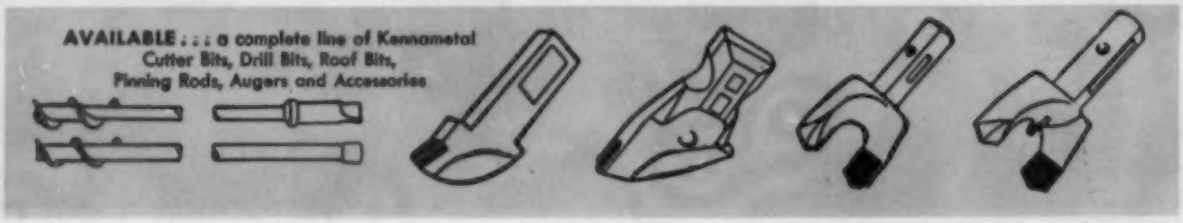
**THE SOLUTION:** The cooperative efforts of Enoco, Jeffrey Mfg. Co., Cincinnati Mine Machinery Co., and Kennametal Inc. led to the development of special bit holders and the Kennametal Taper-Shank Bit. These were put in service on the outer positions.

**THE RESULTS:** Bit costs were reduced 66%. Coal production continues at even higher levels. Bracket trouble has been reduced at least 90%, according to John Stachura, General Superintendent. The 50% reduction in bit changing time provides added valuable production. Bit changing is so easy that Colmol operators keep sharp bits in the machine.

If you have a similar problem, Kennametal Taper-Shank Bits may provide the solution. A Kennametal representative will gladly demonstrate them. He is located near you. Or write KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Trademark

C-3018



Kennametal Style U7T
Taper-Shank Cutter Bit

# and they provide these advantages wherever full-face continuous miners are utilized

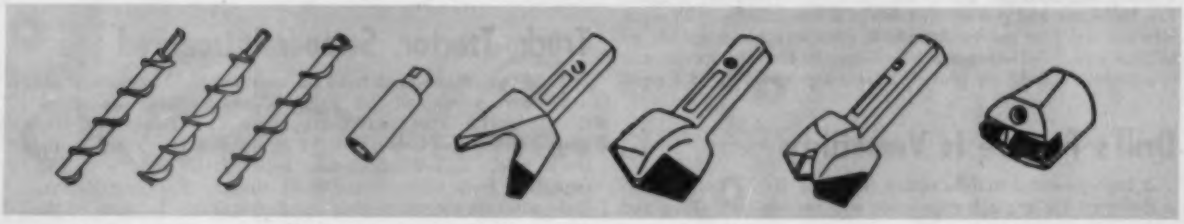
Benefits provided by Kennametal Taper-Shank Bits result from several unique features of these bits. The taper-shank and bit block have full contact throughout the length of the bit shank, holding bits more firmly and accurately. This eliminates tendency of bits to wobble and increases service life of both bits and block. Furthermore, the bits cut more accurate and consistent clearances. The taper automatically sets the bit gage. Changing bits requires less than half the time required for changing bits with conventional setscrew type holders.

In addition, Kennametal Taper-Shank Bits have many of the features of other Kennametal Cutting Bits: high quality carbide grades; I-beam construction for additional strength and cutting clearance; thinner web with less steel to grind; top angle for effective control of cutting flow; and ample support for the carbide.

INDUSTRY AND
**KENNAMETAL**
*...Partners in Progress*

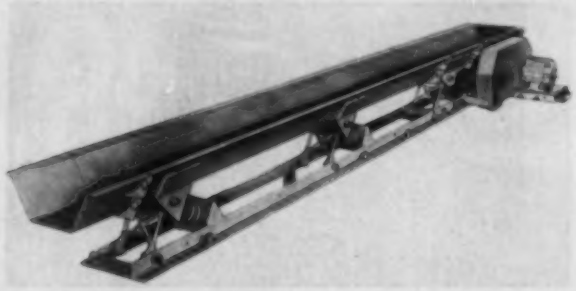
Kennametal Taper-Shank Cutter Bits are easy to install. (Conventional holders are shown on inner positions.)

Changing bits is also easy with a drift wedge at knock-out shoulder or bottom of shank.



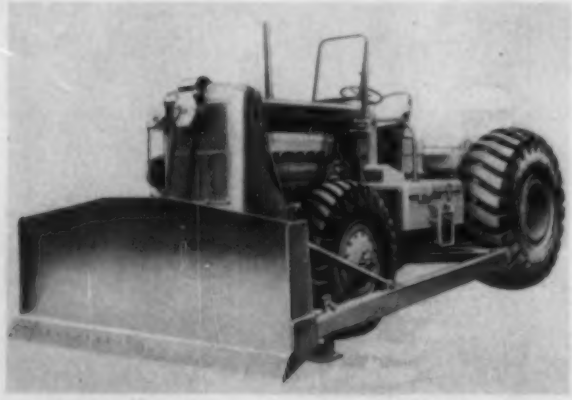
COAL AGE

# EQUIPMENT NEWS



## Medium Range Oscillating Conveyor

A new design in oscillating conveyors—the Coilmount—is the most recent addition to the oscillating conveyor line of Link-Belt Co., Prudential Plaza, Chicago 1, Ill. The company says the unit is designed for applications in intermediate ranges and capacities. It is engineered to fill a place between the company's light and heavy Flexmount and Torqmount conveyors for bulk materials. The conveyor is similar to the Flexmount and Torqmount, but its trough is supported by cast aluminum rocker legs and coil springs. Motion is imparted by a constant stroke eccentric drive that produces an upward and forward oscillating movement. Link-Belt is making the unit in fully assembled sections of 5 to 10-ft lengths, and in trough widths of 10 and 20 in. Sections can be assembled in lengths up to 100 ft.



## Four-Wheel Drive Tractor

Caterpillar Tractor, Peoria, Ill., has introduced a 300-hp (maximum output) four-wheel drive tractor, the No. 668, Series C. The unit is said to combine fast travel and work speed with high tractive effort because of its four-wheel drive. Primary applications: powering scrapers, bulldozing, logging. For bulldozer and pusher operations, a transmission with eight forward and four reverse speeds is used to achieve speeds up to 26.3 mph. For scraper applications, 10 forward speeds and two reverse speeds are provided for a top speed of 32.1 mph.

## Drill's Feature Is Versatility

A high-powered mobile rotary drill, the B-52 "Pacemaker," is designed for auger boring, core and percussion drilling and

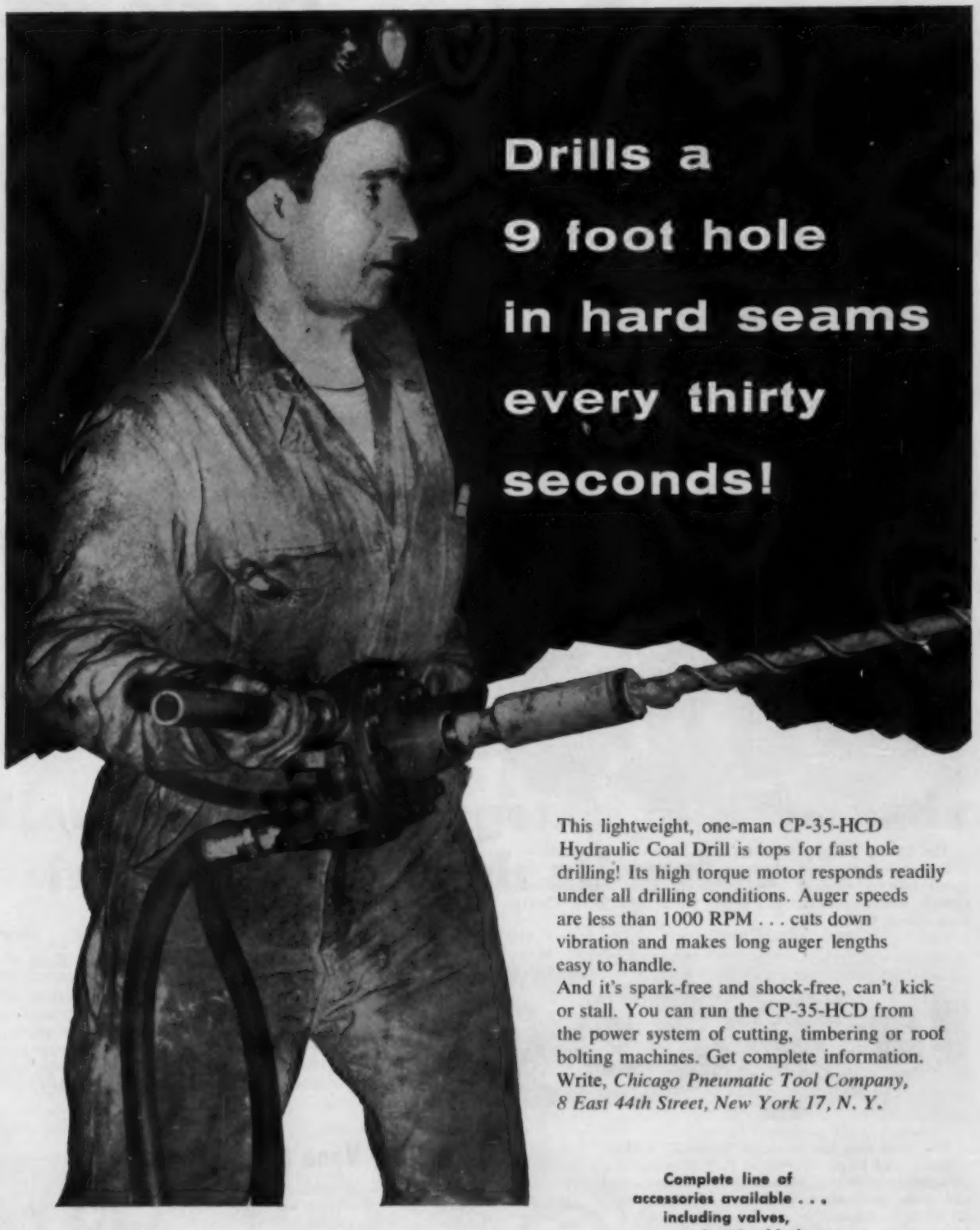
soil-sampling tasks, according to its manufacturer Mobile Drilling, Inc., 960 No. Pennsylvania St., Indianapolis, Ind. Mobile says that the "Pacemaker" is the only mobile rig now on the market that can handle all four types of drilling operations. Besides this "extraordinary versatility," the company says, the drill features a "hollow stem" auger that permits undisturbed soil sampling without withdrawing the auger from the hole. Thus, drillers can take samples without interrupting boring operations. Coring may also be continued through the hollow stem of the auger when rock has been reached.

Described by Mobile Drilling, its manufacturer, as a "verttable laboratory," the Pacemaker is able to stay in the field nearly indefinitely. It is equipped with lock-up cabinets for soil sampling equipment, plus racks for extra augers, drill stems and other tools.

Self-powered, the unit will generate up to 5 tons push or pull ram force with a twin hydraulic feed that responds to fingertip control. It will handle 6-ft sectional augers in sizes from 3 in to 24 in and drive a full 6-ft stroke. It bores to 150 ft in unconsolidated materials, to 600 ft with N rods and 1,000 ft with A rods. Other features: a centralized one-man control panel, and a 22-ft tower that permits rod withdrawal in 20-ft lengths and jack-knifes to a horizontal traveling position.

## Truck, Tractor, Scraper Introduced

A 30-ton off-the-road truck, a medium 143-hp tractor, and a 27-cu yd version of the "Fullpak" scraper have been introduced by Le Tourneau-Westinghouse Co., Peoria, Ill. The 30-ton truck, the LW-30, is the company's first entry in the truck field. LeT-Westinghouse believes the unit is a true departure from conventional truck design. For example, the body rides on air rather than on steel springs. In place of the



# Drills a 9 foot hole in hard seams every thirty seconds!

This lightweight, one-man CP-35-HCD Hydraulic Coal Drill is tops for fast hole drilling! Its high torque motor responds readily under all drilling conditions. Auger speeds are less than 1000 RPM . . . cuts down vibration and makes long auger lengths easy to handle.

And it's spark-free and shock-free, can't kick or stall. You can run the CP-35-HCD from the power system of cutting, timbering or roof bolting machines. Get complete information. Write, *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

**Complete line of accessories available . . . including valves, gauges, junction blocks, hoses and fittings**

**Chicago Pneumatic**

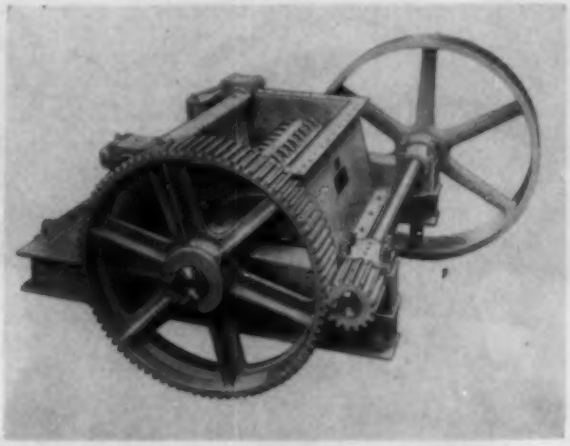
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

springs LeT-Westinghouse has installed giant-size pistons. Conventional axles, too, have been eliminated. In addition, a special steering system eliminates conventional low-hanging tie rods, a design that moves all steering linkage up within, or above, the truck's frame. Chassis grease fittings have been removed, too, and all grease points have special bearings lubricated and sealed at the factory. A new engine, a 375-hp Cummins, powers the LW-30.

reduce drilling time as much as 30%. The rig is designated the MM-2 "Drillcat" and is entirely self-propelled. Its drill, mast and air power are mounted for one-man operation, says Thor. Air-operated crawlers permit the rig to move over the roughest terrain and thus eliminate labor crews to move it into position.

The Drillcat consists of Thor's 105M drifter rock drill and its BW-2 wagon drill mast. Mounted on crawlers the unit is equipped with twin reversible 7½-hp air motors. Weighing in at 3,000 lb, the Drillcat measures 6 ft 9 in long and 6 ft wide. Its boom length is 3 ft 8 in.

The 143-hp tractor, designated the Model D Tournatractor, is in the medium-size tractor class. Its chief features are high speed and mobility. A new design is its planetary steering system, which maintains full power on all four drive wheels, even during turns.



## Intermediate Duty Crusher

McLanahan & Stone Corp., Hollidaysburg, Pa., has introduced an intermediate duty crusher named the Super Black Diamond. Produced with a 24-in roll diameter in seven widths (24 in to 60 in), the crusher contains some of the features of the heavy duty Rockmaster crushers, according to the company. A Steelstrut toggle protects the machine from damage by uncrushable materials, and a device permits product size changes without stopping the crusher. Construction features: cut steel gears, split bronze bearings, an easily removed crushing plate and steel segment rolls.

The third unit, the 27-cu yd Model B "Fullpak" scraper, is a newer and larger version of LeT-Westinghouse's Model C. Powered by a 293-hp, six-cylinder Cummins diesel, the scraper can attain speeds up to 28.43 mph. Complete turns in less than 40 ft can be achieved because of 90 deg steering. The company boasts more than 50 "under-the-skin" improvements, e.g. a longer wearing 16-in double plate clutch, a heavier drive shaft, and a constant voltage transformer.

## Rock Drilling Crawler

Thor Power Tool Co., Aurora, Ill., has introduced a rock drilling crawler which the company says has been designed to

## 2,000 Psi Vane Pump Offered

A new series of balanced vane hydraulic pumps for continuous 2,000 psi service has been announced by the Denison Engineering Div., American Brake Shoe Co., Known as the "T" Series the pumps are of special construction featuring Denison's hydraulically balanced vane. The company is offering the series in ratings up to 100 gpm at speeds up to 1,800 rpm. The units are available with either clockwise or counter clockwise shaft rotation, either of which can be reversed.

A unit consists of a housing which provides an outlet connection, a bore for support of the shaft bearing and shaft assembly, and a larger bore which contains the floating pumping cartridge. The pump may be face-mounted, foot or flange-mounted

# B.F.Goodrich

## How Eagle-Picher gets 2 to 3 retreads from B.F.Goodrich all-nylon tires

THE EAGLE-PICHER COMPANY mines and processes lead and zinc ore in northeastern Oklahoma. Inside the mine, dump trucks haul 9.5-ton loads, trailers haul 15-ton loads. Diesels used for outside hauling average 15¾ tons per load. Eagle-Picher used B.F.Goodrich *all-nylon* tires for all these jobs.

The B.F.Goodrich Rock Logger tires above and Universal tires (below left) work inside the mine on a bed of slippery flint rock, yet carry over 3,500 tons a month and give 18 months' service before retreading. Traction Express tires (below right) cover up to 4,000 miles a month on gravel roads. In spite of this rugged work, Eagle-Picher gets as many as 3 retreads from B.F.Goodrich tires!

The B.F.Goodrich *all-nylon* cord body is stronger than ordinary cord materials, withstands double the impact and resists heat blowouts and flex breaks. That's why the B.F.Goodrich *all-nylon* cord body outwears even the extra-thick tread, *can be retreaded over and over!* You get more hours of tire service at lower cost per hour.

Your B.F.Goodrich dealer has a tire for every kind of mining work. Ask him to show you the tires that will save you money or write: *B.F.Goodrich Tire Company, A Division of The B.F.Goodrich Company, Akron 18, Ohio.*

**THESE UNIVERSAL** tires carry 15-ton loads, often make over 250 trips a month on slippery, razor-sharp flint rock.

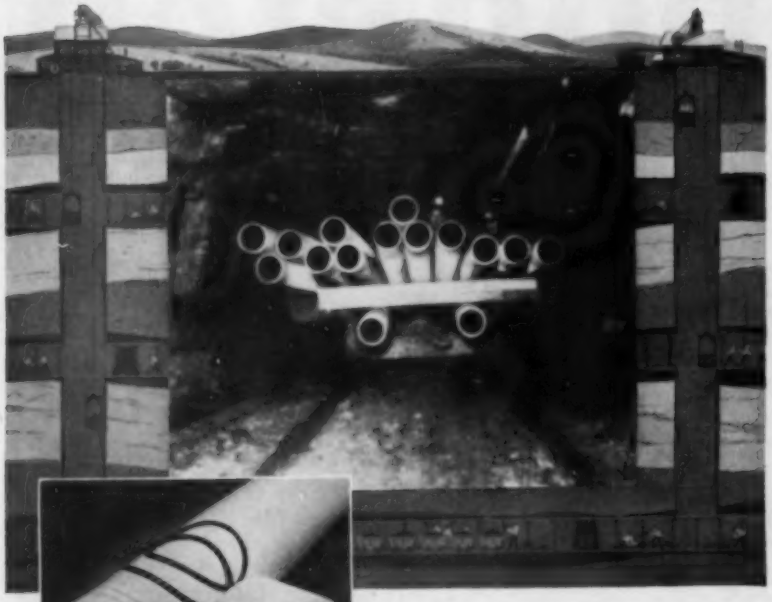
**ALL-NYLON** Traction Express tires work 48 hours a week hauling ore from Eagle-Picher mine. Company uses 3 types of BFG tires.

**Specify B.F.Goodrich tires when ordering new equipment**

**B.F.Goodrich**
FIRST IN RUBBER

***Your B.F.Goodrich dealer is listed under Tires in the Yellow Pages of your phone book***

# *Time-proven in mine service...*



## Transite Pipe with the new Ring-Tite Coupling

### Cuts installation costs through fast assembly—insures locked-in tightness

MINE OPERATORS have found that Transite® Mine Service Pipe offers many advantages in addition to its long service life. Now with the new Ring-Tite® Coupling, pipe goes together faster, assuring even greater savings in installation.

***Proven Corrosion-Resistance***

Over a period of many years' service, asbestos-cement Transite Pipe has proved its ability to stand up under the corrosive action of acid mine drainage water. It is light in weight and easily handled. Lines are quickly assembled, even in restricted mine passages. The new Ring-Tite Coupling forms a tight, yet flexible joint that permits deflections of up to 5° at each coupling.

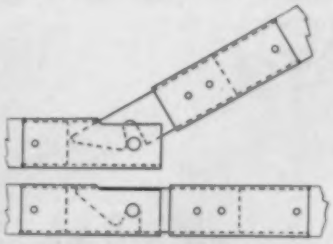
Available for working pressures up to 200 lbs. per square inch and in a full range of diameter from 4 inches up, Transite is also a money-saving pipe for many other mine uses.

For complete information about the new Ring-Tite Coupling and about Transite Mine Service Pipe write for Brochure TR-51A and TR-160A, Johns-Manville, Box 14, New York 16, N. Y.

**Johns-Manville**
**TRANSITE Mine Service Pipe**


## Equipment News (*Continued*)

in any of four positions on its mounting bracket. The suction inlet port can be assembled in selected positions with regard to the pressure delivery port.



### Detachable Tamping Stick

The Lock-Hook, a tamping stick manufactured by G. R. Johnson Loading Supplies, 5026 Butterworth Rd., Mercer Island, Washington, is constructed of Douglas fir and is designed with a copper hook mounted at one end, a bronze pin fitting on the other. The stick's crimped end and ferrule are made of aluminum alloy. The Lock-Hook can be coupled to additional sticks with a hooking motion. Johnson Loading says that a powder screw can be attached to the wood end of the stick to remove powder from long holes. In addition to making 1-in and 1¼-in diameter sticks the company supplies couplings for buyers to mount on their own poles. Stock lengths and diameters of factory-made sticks: 5 ft to 12 ft, 1 in to 1¼ in.

### Current Reading Unit

A snap-around volt-ammeter, the RS-1 Amprobe, is being manufactured by the Pyramid Instrument Corp., Lynbrook, N.Y. The unit permits selection of any one of four-amp and two-voltage ranges. Feature: a pointer lock which holds the pointer needle in place when a reading is taken. Pyramid points out that the Amprobe RS-1 can be used for measuring current without cutting conductors.

### Battery Breakage Cut

A new material for industrial storage battery cell containers is said to virtually

# HAUL

**HAUL** at high capacity.

**HAUL** the low-cost way.

**HAUL** with less maintenance.

**HAUL** anywhere—above ground or below ground . . . from mine to classifying plant, to storage, to car, barge or truck.

## HAUL with standardized, pre-engineered Barber-Greene Conveyors.

Barber-Greene standardized conveyors permit faster quotation and delivery, lower cost erection, easier future alteration. Pre-engineered components include: Frames, Trusses, Drives, Take-ups, Feeders, Hoppers, Brakes, Housings, Supports, etc. Ask for the Barber-Greene 192-page Conveyor Catalog.

Over 4,300' of Barber-Greene Belt Conveyors handle 45,000 to 55,000 tons of coal each month at the Sauceda mine in Palau, Mexico. These conveyors move the coal to the transfer bin for loading, to the stacker for stockpiling and reclaiming . . . or to the processing plant.

This 119' Barber-Greene Stacker pivots on a curved track to deliver up to 250 tons per hour to any of five silos. Built for the Chicago Wilmington & Franklin Coal Company, this Barber-Greene installation has a capacity that can be quadrupled when required.

55-22A-UPE

**Barber-Greene** BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

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## METHOD OF PIPING

**VICTAULIC HAS EVERYTHING...**

**VICTAULIC COUPLINGS**

Simple, fast, reliable. *Styles 77, 77-D,* for standard uses with steel or spiral pipe, — *Style 75* for light duty. Other styles for cast iron, plastic and other pipes. Sizes ¾" to 60".

**ROUST-A-BOUT COUPLINGS**

For plain or beveled end pipe *Style 99.* Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bull-dog" grip on the pipe. Sizes 2" to 8".

**VICTAULIC SNAP-JOINTS**

The new, boltless, speed coupling, *Style 78.* Hinged into one assembly for fast piping hook-up or disassembly. Hand locks for savings in time and money. Ideal for portable lines. Sizes 1" to 8".

**COUPLINGS FOR EVERY PIPING JOB**

**VICTAULIC FULL-FLOW FITTINGS**

Elbows, Tees, Reducers, Laterals, a *complete line*—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes ¾" to 12".

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Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes ¾" to 8".

**PLUS FITTINGS AND GROOVING TOOLS**

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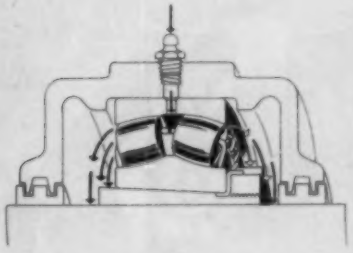
Write for NEW Victaulic Catalog-Manual No. 55A-3

**VICTAULIC COMPANY OF AMERICA**
**P. O. BOX 509 • Elizabeth, N. J.**


## Equipment News (*Continued*)

eliminate battery breakage, according to C & D Batteries, Inc., Conshohocken, Pa. The material is called "Hi-Impac," and is a development of C & D's research department and major rubber companies. The material will replace present materials in the C & D Slyver-Clad line.



### Bearing Lubrication

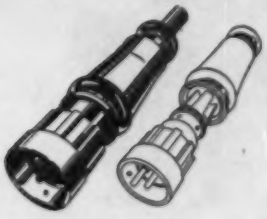
SKF Industries, Inc., has announced an improved method of lubricating spherical roller bearings, in which "center" lubrication rather than "side" is attained. The method, which is accomplished through design, works this way: a groove is machined on the circumference line of the bearing's outer ring with equally spaced holes drilled in the ring. The fitting, which is situated in the center of the housing cap, directs lubricant along the groove, through the holes and to the center of the bearing. This enables the lubricant to flow from the center to the sides of the bearing. Old lubricant is flushed and a fresh amount supplied. SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.

### Side Dumping Bucket

A side dumping bucket attachment for Traxcavators is being produced by the Caterpillar Tractor Co., Peoria, Ill. Chief advantage: in-line loading to eliminate constant turning to dig and to load. The result is not only a reduction in loading time, but lower maintenance cost since

## THIS CONNECTOR HAS TO BE *Tough!*

**STRAIGHT PIN BIGUN** (SPB) styles are molded to 36" (Or as specified) leads. Have threaded metal couplings. Ask for Bulletin B39a.



**"QUIK-LOC"** styles attach quickly to your cable. New-type couplings engage or disengage in ¼ turn. Ask for Bulletin B57.

IT IS! It's a Joy Connector . . . a non-corrodible, moisture-tight electrical coupling with a rugged coat of flame-resistant, shatter-proof, distortion-resistant Neoprene. Soak it in water, hit it with a sledge, drag it through oil . . . it'll take that and more.

Joy plugs and receptacles are built for long, maintenance-free service under the most adverse conditions. They're produced in styles and sizes to meet every need . . . for both AC and DC applications. "SPB" and "Quik-Loc" designs are available with pilot control contacts for *permissible operation* with Joy's Bureau-of-Mines-Approved distribution centers (SCC units).

For details, write *Joy Manufacturing Company, Electrical Products Division, 1201 Macklind Avenue, St. Louis 10, Missouri.* Executive Offices: *Oliver Building, Pittsburgh 22, Pennsylvania.*

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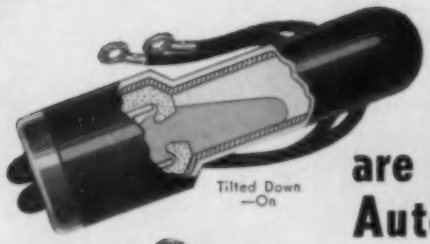
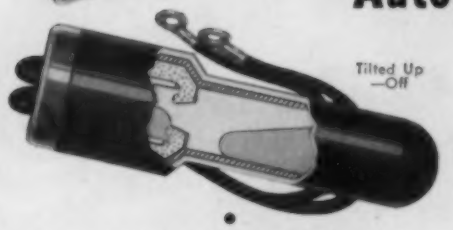
Cable Vulcanizers

WSW CO-6431




# DURAKOOL Tilt Switches are the Life of your Automatic Controls




This steel-clad Durakool mercury tilt switch has unique construction features that deliver years of trouble-free performance on the most difficult assignments you can find. Operating under sealed-in, pressurized hydrogen gas, it takes 24 hours, fast cycling schedules in stride. 7 sizes, 1 to 65 amperes. Send for Bulletin 525.

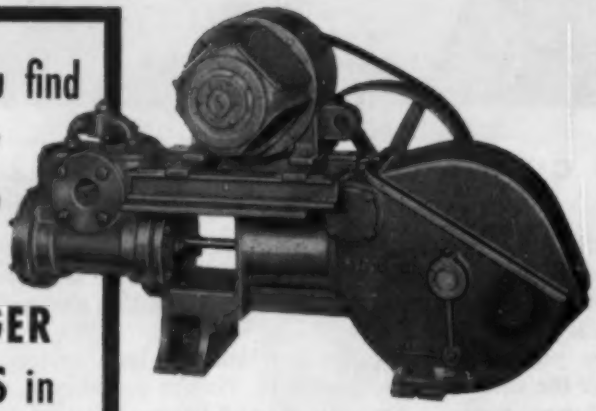
MILLIONS OF CYCLES WITHOUT FALTERING

See telephone directory for local distributor, or write.

DURAKOOL, INC.
ELKHART, INDIANA, U.S.A.
700 WESTON RD., TORONTO 9, CANADA

Durakool ALL-STEEL MERCURY Switches

Why you find so many FLOOD CITY PLUNGER PUMPS in use in the coal industry



This popular Plunger Pump, which uses the Flood City Reversible Water End, pumps efficiently even under the most difficult conditions. Built of heavy, acid-resistant bronze or stainless steel, easy maximum flow of water is certain at all times. A large, hinged cover on the completely enclosed power end allows quick access for inspection or repair of working parts. Self-lubrication via the crankcase reservoir keeps all moving parts working smoothly requiring a minimum of maintenance. The intermediate shaft rotates on roller bearings. Piston rod is shielded to prevent water from reaching the power frame.

Available in several sizes to handle as much as 100 GPM

Detailed information and prices for your particular pumping problem may be had at your request.

SERVICE FC FIRST

FLOOD CITY BRASS & ELECTRIC CO.
JOHNSTOWN, PA.

SALES AGENT: KANAWHA RAIL & MACHINERY CO. Charleston, W. Va.


## Equipment News (*Continued*)

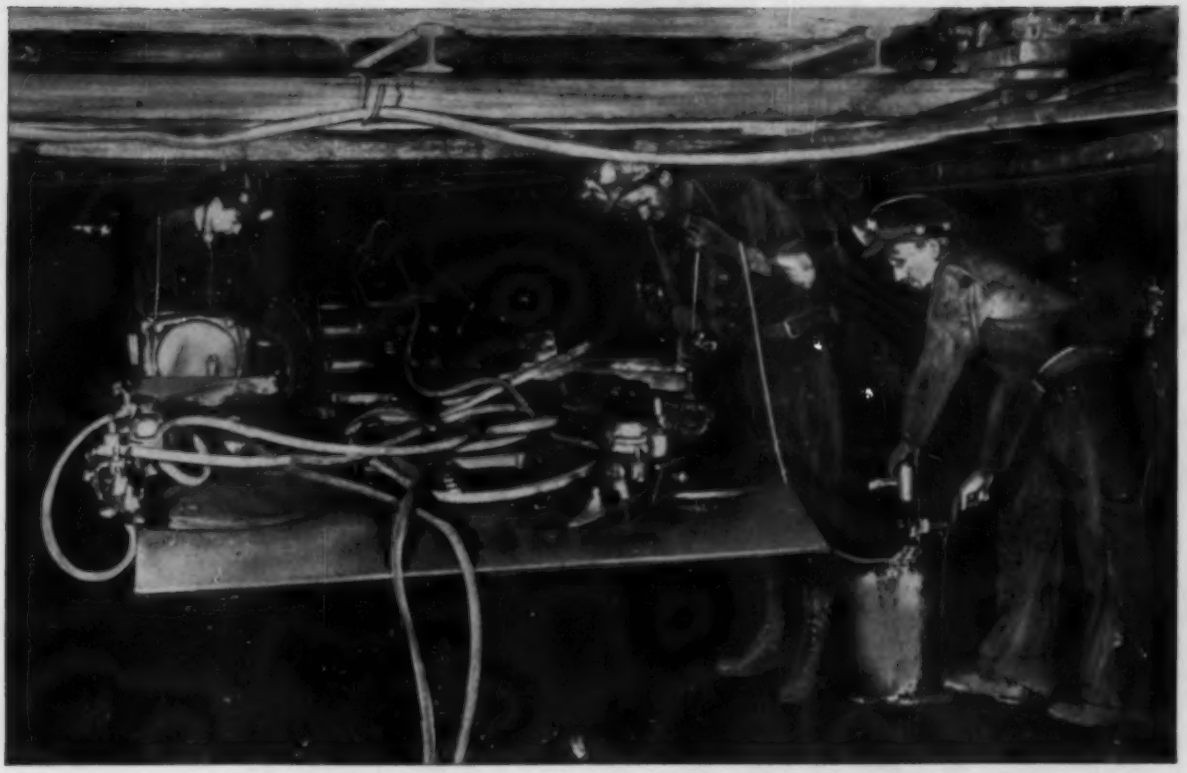
less machine wear cuts parts replacement. Side dumping is accomplished by using a hydraulic cylinder mounted on the bucket carriage. The bucket is hinged to the carriage and locked in place when digging. In operation the dumping cylinder unlocks the bucket, swinging into a side dumping angle of 60 deg.

### Blade Rips, Moves Material

The "Gyro-Dozer," a new tractor attachment combines ripping and moving in one bulldozing operation, according to the manufacturer, Caterpillar Tractor Co., Peoria, Ill. The company, which plans to equip the Caterpillar D7 tractor, with the new attachment says the unit will produce full blade-loads in less time and shorter distances. The bulldozer reportedly provides greater dozing efficiency by restricting the length of cutting edge entering the ground, by breaking up and conditioning hard material more readily, and by supplying a more efficient wedging angle to utilize the full power of the tractor.

### Drill Handle Absorbs Shock

Shock-absorbing handles for use with Le-Roi-Cleveland hand held rock drills are being sold by the company with new drills or as replacements for old models. Designed to absorb recoil and vibration, the handles reportedly reduce operator fatigue. Rubber cushions, built in to the mechanism of the new handle, absorb vibration. Engineered for use with Le-Roi's H-10, H-12 and H-111 sinker



*1957 . . . Year of Record Production!*

## NOW . . . MORE THAN EVER . . .

## YOU NEED BETTER LUBRICATION

Production will set a new high this year. Now, more than ever before, you can't afford machinery down-time that *better* lubrication can prevent!

Amoco refining facilities are responsible for the nation's only unleaded premium motor fuel—Amoco-Gas. It stands to reason that such advanced facilities should be responsible, as well, for the *better* lubricants needed to meet today's skyrocketing demands on coal mining equipment.

Call in an Amoco mine lubrication engineer. His survey and thorough-going analysis can make the difference in the tonnage you need to meet or surpass your goal. Now—when the need is greatest—see what Amoco quality can do for you.

**AMOCO LUBRICANTS**

AMOCO®

*Higher Quality . . . for Better Lubrication . . . at Lower Cost.*

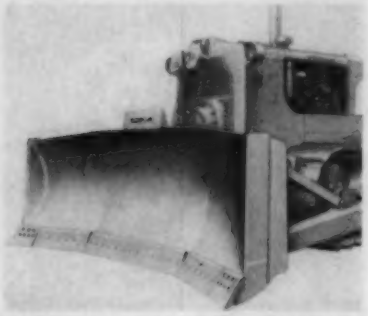
## Equipment News (*Continued*)

drills, the handles can be adjusted to suit a desired degree of vibration dampening. Although standard equipment on the H-10, H-12, and H-111, the handles also are sold in modification kits for equipping former models. More information from Sales Promotion Dept., Le Roi Div., Westinghouse Air Brake Co., Milwaukee 1, Wis.

### Mobile Radio-Telephone

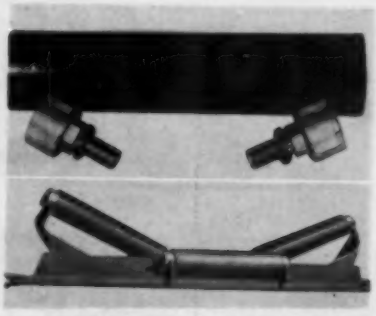
A mobile AM radio-telephone designed for long distance communications under

adverse terrain conditions is being produced by Kaar Engineering, Box 1320, Palo Alto, Cal. Traded as the TR 245, the 50-w, two-way unit can be installed in cars, truck, jeeps, etc. It uses a frequency range of 1.6-8 Mc, features strip chassis construction, optional dual channel operation, and 6 or 12 v operation without modification. Dimensions, 6x9x11 in. Weight, 27 lb.



### End Spillage Minimized

The 9U bulldozer above was designed by Caterpillar for its D9 tractor. The unit is said to be suitable for stripping and coal handling. Designed with a straight center section and two side sections angled forward, the dozer's side sections cast material inward, the straight center section pushes material ahead. Thus, says Caterpillar, there is a minimum of end spillage.

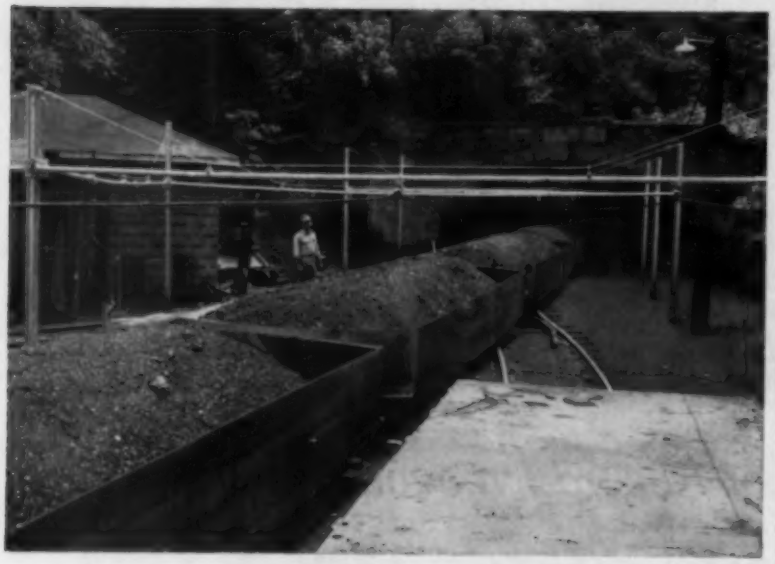


### Roller Stud Assembly

A removable ball bearing stud assembly for belt conveyor rolls is designed, says the manufacturer, to cut maintenance and replacement costs on rolls and return idlers. With the assembly a conveyor roller shaft turns in ball bearings that are mounted on the removable studs. Thus a stock of rollers is unnecessary. The maker, Bearings, Inc., 3634 Euclid Ave., Cleveland 15, Ohio, says that only the bearing studs will have to be stocked for emergency replacements. All maintenance, the company points out, is done at the conveyor. Rollers complete with the removable studs are available in diameters 2¾ in to 4 in, in lengths 12 in to more than 36 in.

### Conveyor Belt Cleats

Conveyor belt cleats that can be fastened to a belt in a few minutes by anyone are being manufactured and sold

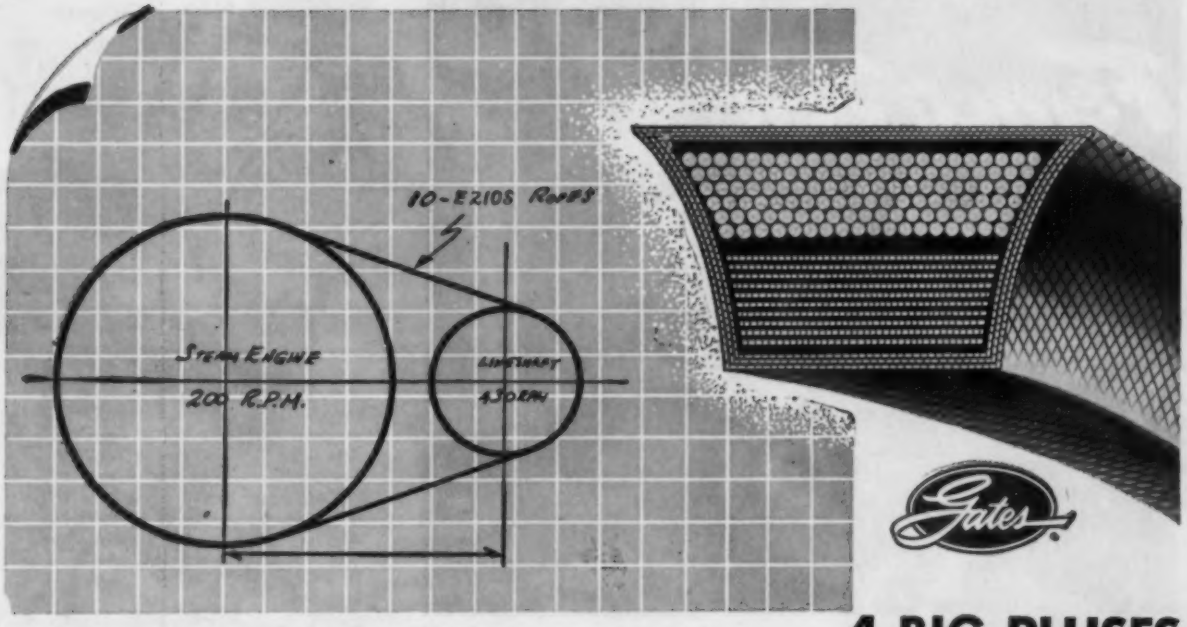
haulage capacity...

Place Lundale, W. Va.
Operator Amherst Coal Co.
Car Dimensions Length: 24' 6"
Width: 8'
Height: 36" (above rails)
Weight: 9200# empty
Capacity 456 cu. ft. (level load)
536 cu. ft. (crown load)

where can you match it?

Since 1915—
Pioneers in
haulage equipment

DIFFERENTIAL
STEEL CAR COMPANY
FINDLAY, OHIO




# MORE HP DELIVERED PER $ INVESTED

On any new drive design—where you have limited space or you need to keep weight down—here is an important fact that can save you money:

A Gates Super Vulco Rope drive will deliver more horsepower per dollar invested than any standard V-belt drive.

Actually, the greater load carrying capacity of Super Vulco Ropes cuts down the number of belts required (5 Super Ropes do the work of 7 standard belts) . . . thus reducing the width of sheaves.

Sheaves with fewer grooves not only cost less, they weigh less, and take up less room—advantages that can easily improve the design and lower the overall cost.

A wealth of drive data is quickly available to you. Simply call your nearby Gates V-Belt Distributor (see 'phone book yellow pages) for a Gates V-Belt Specialist. Stocks available in industrial centers around the world. The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

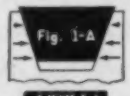
## 4 BIG PLUSES

### ✚ Handles shock loads

Super-strength cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads.

### ✚ Wears far longer

Concave Sidewalls (Fig. 1) increase belt life. As belt bends, concave sidewalls (U.S. Pat. No. 1813698) become straight, make uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . longer V-belt life.



Flex-Weave cover (U. S. Pat. No. 2519590) provides greater flexibility with far less stress on fabric. Cover wears longer—increases belt life.

### ✚ Provides Static Safety

High electrical conductivity is built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

### ✚ Resists oil, heat and weather

Special rubber compounds with which cords and fabric are impregnated make Super Vulco Ropes highly resistant to heat, oil and prolonged exposure.

TPA 76B

# Gates Super VULCO ROPE Drives

# Headquarters for Communication Systems for Mines

COMPONENTS ARE ENGINEERED FOR HEAVY DUTY USE

Sound designing and faithful egineering have made Femco the logical headquarters for modern mine communication.

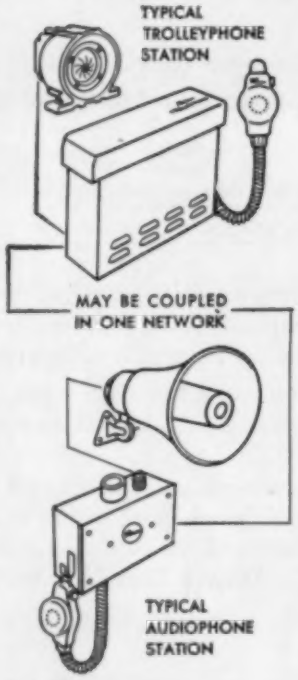
Femco units are the smallest and most compact available. Installation is easy with little space needed for mounting. Components plug in and out for flash service without down-time.

Use Femco Trolleyphones and Audiophones for all mine communication—on locomotives, in cleaning plants, from mine to mine and between levels.

*SALES AND SERVICE AGENCIES*

NATIONAL MINE SERVICE COMPANY, 564 ALCOA BLDG., PITTSBURGH 19, PA.
Division plants: Beckley, W. Va., Logan, W. Va., Fairmont, W. Va., Indiana, Pa., Forty Fort, Pa., Ashland, Ky., Jenkins, Ky., and Madisonville, Kentucky.

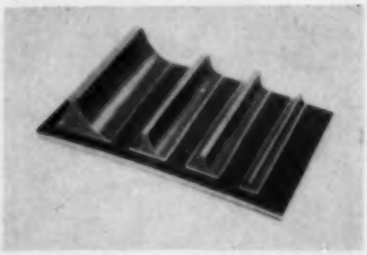
INDUSTRIAL PHYSICS & ELECTRONICS CO., SALT LAKE CITY, UTAH



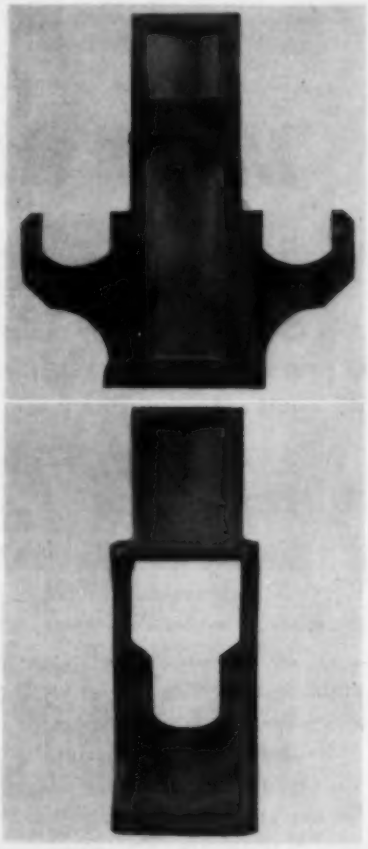

UNderhill 3-3200 **Femco, Inc.** IRWIN, PENNSYLVANIA

COMMUNICATION • Electronic Engineers • AUTOMATION


## Equipment News *(Continued)*



by Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill. The company, which makes belt fasteners for joining conveyor, transmission and V-belts, says that its cleats—named REM.. —are being used advantageously on belts inclined to the point where the load slips or rolls back down the belt. The cleats can be applied to a belt at a 90 deg angle or in the form of chevrons, or V's. They also can be affixed along the sides of a belt to act as guide rails.



### Conveyor Rolls Bracket

A new and, says the manufacturer, more practical bracket for belt conveyor rolls and return idler rolls is being made by Bearings, Inc., 3634 Euclid Ave., Cleveland 15, Ohio. The unit will cut inventory drastically, according to the maker, since each bracket is designed for use on either side of a conveyor. Bearings, Inc. makes the bracket in cast

There's MORE from Allis-Chalmers MOTOR distributors

# Complete Motor Line

multi-speed

wound-rotor

face mounted

open

dc series wound

squirrel-cage

vertical solid shaft

totally enclosed

synchronous

vertical hollow shaft

drip-proof

foot mounted

splash-proof

"Synduction"

explosion-proof

dc shunt wound

dc compound wound

flange mounted

gear motors

## . . . plus quality and service

As part of a national network of more than 200 franchised outlets, your nearby Allis-Chalmers Motor Distributor offers the rare combination of *fast service* and a *complete line* of *fine-performance* integral horsepower motors. He's the right man to give you just the right motor — in a hurry.

**It adds up to:**

**1. Simplified Buying** — Here's one source for all motors from 1 to 200 hp, as close as your telephone. Single source trims clerical costs, minimizes purchasing and accounting expenditures.

**2. Reduced Inventory** — You don't have to tie up funds and warehouse space with spare motors and replacement parts. The A-C Distributor is your motor storehouse.

**3. Continuous Production** — Your A-C Distributor can deliver a motor to your shop in a matter of hours. (And, once you order an A-C motor, you're sure of 'round-the-calendar operation.)

GET ACQUAINTED with your Allis-Chalmers Motor Distributor soon. You can find out his name by contacting the A-C sales office in your area, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Synduction is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5187

lightweight, high tensile strength aluminum or high strength gray iron. Another unit, a combination return idler bracket utilizes both right and left hand types in one unit. This, too, is made in either aluminum or gray iron.

## General Work Pumps

Standard, close-coupled centrifugal pumps designed for general work at low cost are being made by Dean Bros. Pumps, Inc., 323 W. 10th St., Indianapolis 7, Ind. Designated Type "GSC," the line comprises seven pumps with capacities up to 600 gpm and total dynamic head up to 275 ft. Liquid temperature ranges are from minus 40 deg to 250 deg. Dean Bros. makes the pumps in iron, bronze and bronze-fitted models. Standard construction includes: a removable back head which permits removal of the impeller without disturbing piping; a large cradle opening for free access to the stuffing box; and a stuffing box adaptable to packing and mechanical sealing.

# Only STAMLER

## makes a Car Spotter

## Especially Designed

## for DROP-BOTTOM Cars!

**Only STAMLER has the *Specialized Designs* NECESSARY for ALL TYPES of Cars!**

WE do not know of any car spotter that will handle all types of mine cars with equal efficiency. Since the cars themselves operate in such widely different ways we think it stands to reason that each type of car needs a car spotter designed especially for it.

If one type of car spotter is used on several types of cars it seems obvious that it will work best with one type of car and much less efficiently with the other types. *Here at STAMLER we feel that no modern mining operation can afford any such part-time efficiency in its machinery. That's why STAMLER* makes a car spotter especially designed for Drop-Bottom cars; that's why STAMLER has the specialized designs necessary for all types of cars.

STAMLER *Hydraulic* CAR SPOTTERS

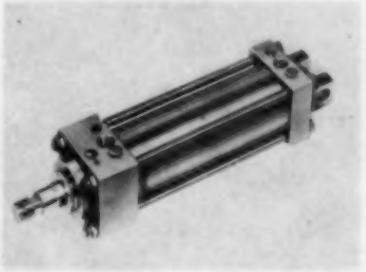
SCHROEDER BROS., Exclusive Eastern Sales Agent
Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

**W. R. STAMLER CORPORATION**
PARIS, KENTUCKY

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO.,
Salt Lake City, Utah

## Portable Generators

Thor Power Tool Co. has entered the portable electric generator field with two 1,500-w models designed with vertical shafts. The entire weight of the generator is supported by a tubular framework. Thus, says Thor, the combination of a vertical shaft and tubular framework free the main bearing shaft from sustaining weight loads normally imposed on it in conventional horizontal designs. Powered by gasoline engines, the two generators – EG-1.5A for AC and EG-1.5D for DC–provide 13 amp of 155 v. Each weighs 95 lb, is 23¾ in high, 23 in in diameter. The engines are four-cycle, single cylinder, air cooled units with automatic rewind starters. Two plug-in outlets are provided.



## Fluid Cylinders

Lindberg Air & Hydraulic Div., Teer-Wickwire & Co., Jackson, Mich., has introduced what it calls its new Squarehead "S" line of cylinders. Rated at 250 psi for pneumatic use or up to 1,000 psi for hydraulic use, the cylinders are made in seven bore sizes up to 6 in. The rod end of the cylinders is equipped with a "quick change" rod cartridge, which is locked to the unit's head by a coiled

# 245 hours less greasing time...
# 245 hours more profit time EVERY YEAR!

Time saved by 1,000-hour lubrication intervals on your Allis-Chalmers tractor adds up to 245 hours every year—an extra month of production!

On truck wheels, support rollers and idlers, an exclusive combination of positive, spring-loaded seals and tapered roller bearings keeps out dirt and moisture, prevents loss of lubricant.

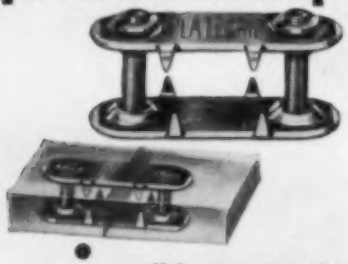
For 1,000 tractor work hours, you can forget about every grease point below track level. When it's time for servicing, simple low-pressure flush lubrication replaces old grease completely, eliminates seal popping, prevents damage to seal faces. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

## IT'S SIMPLE ARITHMETIC!

| | Other Tractors | Allis-Chalmers Tractors |
|---|---|---|
| No. of greasings per year (5,000 hr) | up to 500 | 5 |
| Greasing time (av. conditions) | ½ hr | 1 hr |
| Time spent greasing | up to 250 hr | 5 hr |
| PRODUCTION TIME GAINED . . . 245 HOURS EVERY YEAR! | | |

**ALLIS-CHALMERS** *Engineering in Action*

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS

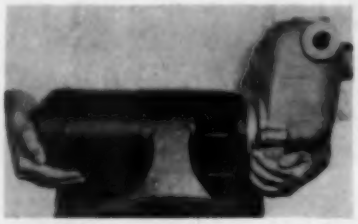


Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.

ARMSTRONG BRAY & CO.
5340 Northwest Highway, CHICAGO 30, U. S. A.

## Equipment News (*Continued*)

steel spring. The spring is seated in matching grooves in the cylinder head and cartridge. By removing one screw the spring can be stripped out (photo) and the rod cartridge removed. The manufacturer says the method means quick replacement of a worn rod seal or rod cartridge. Address: 1836 Wildwood Ave., Jackson, Mich.



### Self-Priming Pump

A self-priming, self-lubricating centrifugal pump—light in weight and designed to resist corrosion—is being made by the Worthington Corp., Harrison, N.J. The pump is available in three ratings—½, ¾ and 1 hp.—and buyers have a choice of 1- or 1½-in suction and discharge openings. A monobloc unit, the pump is equipped with an "extra-heavy shaft and the famous Pyramid mount," according to Worthington. A solid aluminum casing, head and impeller are responsible for the relatively light weight. Worthington points out that the ¾-hp unit complete with motor weighs only 62 lb. Because of its rising head-capacity curve, Worthington says, the unit is recommended where a self-priming pump is required.

### Screen Life Extended

Wedge Wire Corp., Wellington, Ohio, is manufacturing a "Jumbo Kleenslot" wire screen that is said to produce all the tolerances found in the applications of Kleenslot engineering developments. The company says that wire as large as the wire used in the new "Jumbo" was not practical until lengthy research had been completed. Now, openings as close as 1 mm are maintained. Wedge Wire believes the product offers an unusually extended life for screens in applications where abrasives are an important consideration. The "Jumbo" can be interchanged with other types of "Kleenslot" screens.

## *Equipment Shorts*

**BLOCK AND SHEAVES** – Durolite blocks and sheaves by Sauerman Bros., Inc., 620 S. 28th Ave., Bellwood Ave., Ill., are being used on all Sauerman drag scraper machines and cableways. The sheaves are available in sizes from 6 in to 18 in (alloy steel) and 20 in to 24 in (cast steel). Blocks are stocked in sizes 6 in to 18 in with bronze bearings, 8 in to 42 in with roller bearings.

**EARTHMOVING ATTACHMENT**—The Frank G. Hough Co., Libertyville, Ill., offers the Drott "4-in-1" bucket as optional equipment on Models HU, HH, and HO Payloaders. Versatility of the "4-in-1" attachment comes from a design that permits it to be used as a shovel clamshell, scraper and bulldozer.

**TRUCK TRANSMISSION**—"Select-O-Matic," a transmission for heavy duty International trucks has been introduced by International Harvester Co., Chicago 1, Ill. Features: an electro-hydraulic clutch and a torque converter, plus a five-speed synchromesh transmission. The electro-hydraulic clutch is disengaged for shifting by a "magic button" under the gear shift knob.

**TRACTOR ODOMETER**—To record job data Caterpillar Tractor Co., Peoria, Ill., is producing an odometer which records the distances traveled by tractors. The unit can be mounted on spoke type and disk type idlers. The unit will provide 98% accuracy in the lower three gear ranges, 90% in fourth gear, according to Caterpillar.

**DIESELS** – Caterpillar Tractor, Peoria, Ill., has introduced the D353 diesel, a unit capable of delivering up to 390 hp

Here's How You Can Save Time & Money inspecting—cleaning—relocating Your Pipe Lines

ALUMIRON COUPLINGS
(both standard and lightweight)
for grooved end pipe

- Cut material and labor costs by using these malleable iron and aluminum couplings on your steel, aluminum, cast iron, wrought iron and spiral weld pipe.
- Pipelines become "portable" when you couple them with Alumiron Couplings—quickly couple or uncouple them by means of two bolts through the coupling halves. A leak proof seal is easily made by pulling up the two half housings with a socket wrench.
- The flexibility of the Coupling corrects for slight piping misalignment and permits the line to adjust to the slope and uneveness of the ground.
- Furnished with Buna N or Neoprene gaskets. Lightweight series pressure to 500 pounds—Standard series to 1000 psi working pressure.
- Stocked in 2, 3, 4, 6 and 8 inch sizes. Other sizes on request.

Write for Literature and Prices. Distributor Inquiries Invited.

CHARLES E. MANNING CO.
4700 Clairton Blvd. Pittsburgh 36, Pa.

# Your Wickwire Rope Distributor and our sales engineer ... a helpful team

This sales engineer—an expert on the selection, installation and maintenance of our products—is with your Wickwire Rope Distributor every time he makes a call.

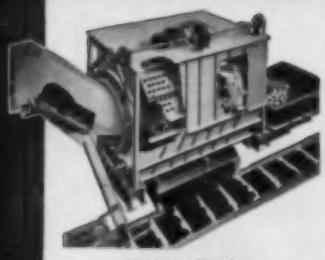
True, sometimes he's hundreds of miles away, working in the field or at the mill. Yet, even if he's not there in person, your Wickwire Distributor has the full assurance that sales engineers such as this one are *always* quickly available to help you.

It's just one more reason why your Wickwire Distributor knows he's got top-quality wire rope, slings and strand to sell... and that these products will serve you well.

4086

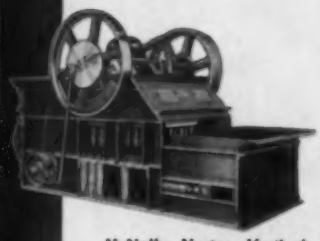
**A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION**

America's most complete line of CRUSHING EQUIPMENT



McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.

McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

McNally Single Roll Crusher

Universal application 20", 24" and 36" diameter rolls.

AVAILABLE

From Stock and on Short Delivery

For immediate action on complete information write, wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas Wellston, Ohio

## Equipment News (*Continued*)

to 390 hp at 1,300 rpm. Powering matched generator it will deliver 200 kw. Caterpillar has also begun manufacturing modified models of their D318 and D315 engines. Both are offered either naturally aspirated or with turbocharger, and are designed for applications where space and weight are important factors. Both units are smaller and lighter than the standard D318 and D315. The D318 is 56 in long (19 in shorter than the standard) and delivers 137 hp at 2,000 rpm. Turbocharging boosts this to 175 hp. The D315 develops 91.5 hp naturally aspirated, 115 hp with turbocharging.

## *Free Bulletins*

**MINE LOCOMOTIVES**—General Electric's locomotives for mining and other industrial uses are reviewed in a 24-p booklet published by the company's Advertising & Sales Promotion Dept., Schenectady, N.Y. The booklet, GEA-6332, is designed to aid the prospective purchaser of industrial haulage. Operating conditions and performances of 14 switcher type and mining locomotives are described and illustrated.

**FLARELESS TUBE FITTINGS**—Catalog 4320, published by Tube & Hose Fittings Div., Parker Appliance Co., covers flareless type Ferulok tube fittings. The catalog includes a section on fittings for mounting in the new SAE straight thread boss which utilizes an o-ring for sealing. Address: 17325 Euclid Ave., Cleveland 12, Ohio.

**SCREEN HEATING**—"Converta-Screen" equipment, which electrically heats vibrating screens to stop screen blinding, is described with text, diagrams and photos in a 4-p bulletin being distributed by the manufacturer, Screen Heating Transformers, Inc., Box 283, Massillon, Ohio. Easy installation, longer screen life, uniform sizing and any-deck-heating are features pointed out by the maker. Sold in kits, "Converta-Screen" equipment — transformer included — can be mounted by most master mechanics. The transformer is positioned above or alongside a screen.

**SURVEYING INSTRUMENTS** — The entire line of surveying instruments manufactured by the David White Instrument Co., 2501 No. 19th St., Milwaukee, Wis., is covered in a new catalog published by the company. New products are listed.

**HYDRAULIC HOSE FITTINGS**—No skive, reusable Hoze-lok fittings for rubber-covered double wire braid hose needed in high pressure service are the subject of Catalog 4433, published by the Tube & Hose Fittings Div., Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio. The fittings do not require a hose cover to be stripped for mounting, and are offered with four different connecting ends. The units are made to fit hoze sizes 3/16 in through 2 in inside diameter.

**AIR COMPRESSORS**—A 20-p catalog covering ½ to 20-hp air compressors is being distributed by the manufacturer, Kellogg Div., American Brake Shoe Co., Rochester 9, N.Y. Described are single and two-stage models, portables, tanks, pumps and accessories.

**SCRAPERS, CRAWLER - TRACTOR SHOVELS**—Allis-Chalmers Mfg. Co., Milwaukee, Wis., is distributing three bulletins describing crawler tractors and pull-type scrapers. Bulletin MS-1137 describes the HD-11G, a diesel-powered crawler; bulletin MS-1126 describes the HD-6G, a similar unit. Matched attachments are also shown. The HD-6G is rated at 1½ yd, the HD-11G at 2¼ yd. In bulletin MS-1149 Allis-Chalmers describes four pull-type scrapers. Photos show the units in action.

**ARC WELDING**—Air Reduction Sales Co. is distributing a new arc welding machine and accessory catalog. Specifications for each machine from ampere ratings to outside dimensions are included. Catalog 1340, Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 150 E. 42nd St., New York 17, N.Y.

**INDUSTRIAL EQUIPMENT**—A 24-p illustrated handbook published by the General Industrial Co. gives descriptive data on the company's office and factory equipment. Included are such items as lockers, small parts cabinets, fireproof blueprint cabinets and glass door display cases. Address: 5736X Elston Ave., Chicago 30, Ill.

**LIGHTING DATA**—A new edition of the RLM standard specifications for industrial lighting units is published as a reference book on industrial lighting standards. The current edition contains revisions for both incandescent and fluorescent lighting units, as well as new

# Reynolds Aluminum mine service pipe

- **Light weight cuts installation cost**
- **Resists corrosion—lasts longer**
- **Non-sparking**
- **Quick coupling—flexible**

Aluminum pipe is the answer to lower costs in mine drainage. In actual use, under conditions that rendered steel pipe useless in three months, aluminum pipe showed almost no corrosion effect after two years.

Three feet of aluminum pipe weigh only as much as one foot of steel. This light weight means handling ease under the most difficult conditions, often permits one man to do jobs that formerly required two or three. Quick coupling devices further simplify use and speed laying or taking up.

Aluminum's flexibility makes strip mine installation faster, easier.

3" aluminum pipe installed by one man in 36" coal.

One man easily carries two 20 foot aluminum pipe sections.

*For informative brochure "Reynolds Aluminum Mine Service Pipe", write Reynolds Metals Company, P.O. Box 1800-NQ, Louisville 1, Kentucky.*

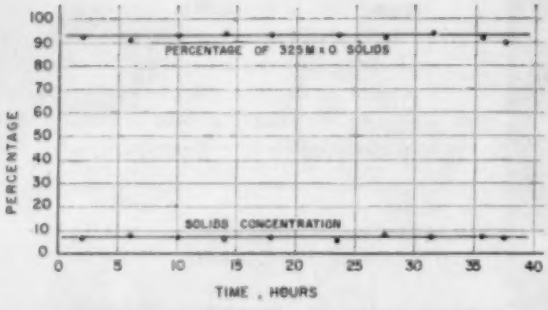
**REYNOLDS ALUMINUM**

*See "CIRCUS BOY", Reynolds exciting dramatic series, Sundays on NBC-TV*

# H&P cyclones

## IT IS NO SECRET

. . . that your coal cleaning operation can function efficiently only if the circulating water density is carefully controlled.




Almost perfect control is recorded in the above graph which covers 40 hours of tests conducted at a Western Pennsylvania Coal Preparation Plant, employing 3″ and 14″ Heyl & Patterson Cyclones.

Uniformity of circulating water concentration becomes a reality by simply adding a Heyl & Patterson Water Clarification Circuit.

**CHECK THESE ADVANTAGES**

- Closed circuit operation
- Recovery of fine coal
- Prevention of stream pollution
- Controlled washing water densities
- Conservation of water
- Sharp classification for washing operation

*Get all the facts . . . Write for booklet CT-954*

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Heyl & Patterson INC.

55 FORT PITT BLVD., PITTSBURGH 22, PA., COurt 1-0750


## Equipment News (*Continued*)

lighting data. RLM Standards Institute, 326 W. Madison St., Chicago 6, Ill.

**TOOL STEELS**—Burke Steel Co., 30 Sherer St., Rochester 2, N.Y., is distributing a 52-p catalog which lists not only brand names used by major tool steel manufacturers, but the more commonly used industrial and governmental specifications as well. A cross-reference method in the catalog helps a user associate brand steels and specifications steels with standard AISI-SAE designations. Thus, buyers can order by using the AISI-SAE specifications, and, at the same time, compare orders with comparable steels traded under brand names.

**TUBE FITTINGS ADAPTERS**—Catalog 4360, issued by Parker Appliance Co., shows straight thread plugs and adapters, o-rings for straight thread fittings, and steel brass pipe fittings. Tube & Hose Fittings Div., Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.

**VARIABLE PITCH DRIVES**—Catalog V-183-A, published by the Browning Mfg. Co., illustrates and describes two types of Browning variable pitch drives. Specifications, plus engineering information and tables of practical stock drive combinations for easy selection, are included. Address: Maysville, Ky.

**COMBUSTION TESTING** — A line of combustion testing and air measuring instruments manufactured by the General Scientific Equipment Co., 7316 Limekiln Pike, Philadelphia 50, Pa., is described with text and drawings in Catalog 138. Included are gas pressure monometers, oil flow graduates, sling psychrometers, air velocity meters, filter gauges, and carbon monoxide detectors.

**INDUSTRIAL PUMPS**—The features of Verti-Line pumps are contained in Bulletin 1100 published by the Layne & Bowler Pump Co., 2943 Vail Ave., Los Angeles 22, Cal. The bulletin includes an easy-to-use table for determining horsepower, capacity and head for vertical pumps.

**TRACTOR TOOLS** — How to make tractors do more by adding the right attachment is covered in an 8-p catalog offered by the Hyster Co., 2902 NE Clackamas St., Portland 8, Ore. The publication includes a line of tractor-mounted accessories for Caterpillar-built tractors. Also presented is the Hyster-developed "Hystaway" excavator-crane, which can be equipped as a dragline, clamshell, crane, pile driver, shovel and backhoe.

**DUMP BODIES, ARM-TYPE HOISTS**—A 12-p catalog illustrating Gar Wood Industries' medium duty dump bodies and arm-type hoists is being distributed from the company's Customer Service Dept., Wayne, Mich. Specifications are given for hoists with 6- to 12-ton capacities. Arm-type, direct lift, and conversion hoists are described.

Handy Tournatractor services 3 shovels over widely scattered work area in 6000′ x 4000′ limestone pit. It pushes in shallow toe ahead of shovel for faster loading. It's fast enough to follow the dipper in and out to clean-up truck and dipper spillage.

# 2 rubber-tired tractors

**. . . clean-up around shovels**

**. . . doze rock between shovel swings**

**. . . service 10 to 12 crushed-stone stockpiles**

**. . . make 2-mile swing service cycles**

At Material Service Corporation's Thornton, Illinois quarry—the largest commercial quarry in the world—over 3,000,000 tons of limestone are removed yearly. To speed shovel clean-up, dozing, and other jobs at this huge 6000′ x 4000′ pit, Material Service Corp. uses 2 fast, 17 mph, rubber-tired, 208 hp Tournatractors.

### Make 2-mile swing cycle

A major advantage of the rubber-tired Tournatractor on this assignment is its ability to travel fast at speeds to 17 mph, from shovel to shovel . . . scattered .2, .9 and 1 mile apart . . . making a swing cycle for clean-up service of over 2 miles. Instant-shift, constant-mesh transmission enables this big rubber-tired dozer to move in fast and back away in a hurry, without delaying the shovel cycle. Between shovel swings, the versatile tractor dozes in scattered rock to keep material in good shovel-loading position . . . also pushes back toe of blasted material from bank ahead.

### Tires eliminate abrasive wear on multiple track parts

Big, low-pressure rubber tires with heavy ground-gripping action make Tournatractor safe and sure-footed. Tires roll *over* abrasive materials . . . do not grind *in* them. They cushion the ride for the operator, and reduce maintenance to a minimum, because 4 wheels do the work of some 500 wearing parts in a crawler-tractor's track mechanism.

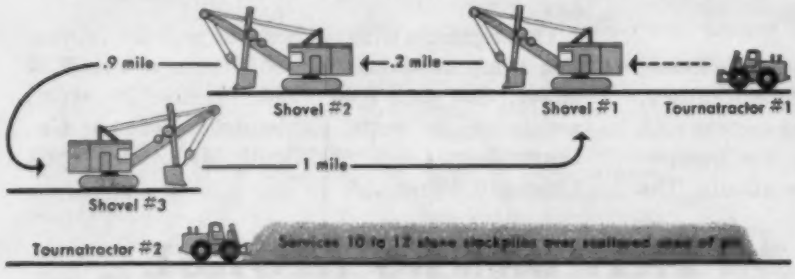
Power from the Tournatractor's 208 hp diesel moves on high-speed, anti-friction bearings sealed in oil. With this all-gear drive you have no chains or tracks to stretch, snag, or wear. Power goes direct from transmission to drive wheels. As a result, there are less friction losses and wear due to hundreds of open parts grinding in dirt or abrasives.

Before you buy a tractor for your clean-up, dozing, servicing, maintenance, or other jobs, investigate the high speeds, lower maintenance, and greater mobility that Tournatractor can give you. It frequently replaces 2 or 3 crawlers in one pit!

Fast 17 mph speeds enable Tournatractor to travel anywhere in the pit, dumps, stockpile area, or plant, with only a few minutes moving delay between assignments. One man, one machine, can make two or three cycles, to cover all clean-up assignments per shift. Often, several near-by pits are serviced by one of Material Service's Tournatractors.

Tournatractor maintains and services 10 to 12 crushed stone stockpiles located over a widely scattered area of the quarry. Equipped with 11′ 4″ wide, 3′ 7″ high bulldozer blade, Tournatractor dozes bladeful of abrasives.

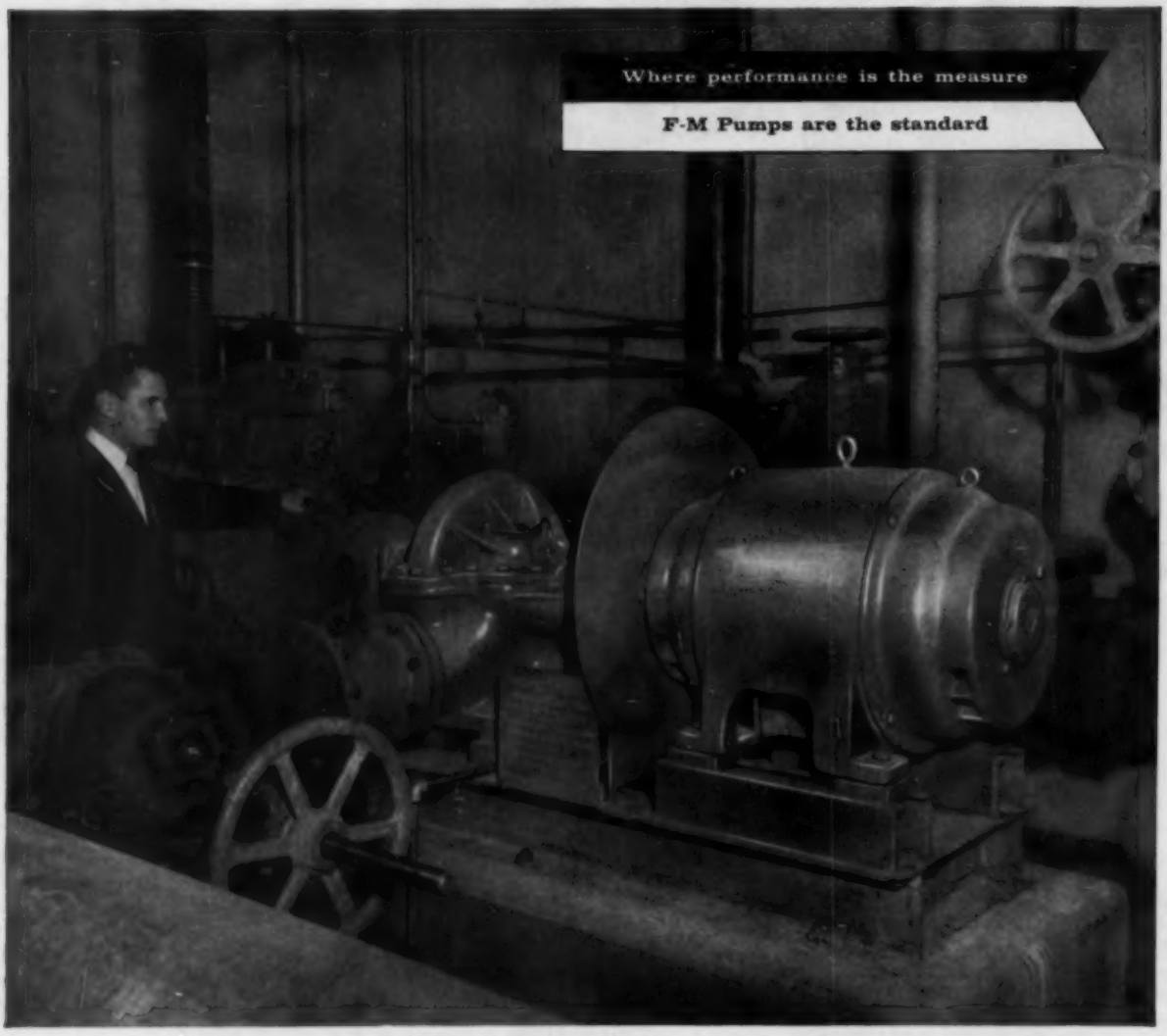
Tournatractor — Trademark Reg. U.S. Pat. Off. T-940-Q-b




**LeTourneau-WESTINGHOUSE Company,** PEORIA, ILLINOIS

*A Subsidiary of Westinghouse Air Brake Company*

WHERE QUALITY IS A HABIT




Fairbanks-Morse 6" dual-driven fire pump in jet engine testing laboratory.

# Standby against 3500 degrees!

Full power testing of Navy jet engines creates exhaust heat up to 3500° F. a few feet from explosive fuel—a constant fire hazard when in the confines of the testing laboratory.

To insure positive protection against fire losses, Thompson Products Gas Turbine Laboratory, Perry, Ohio, has installed a sprinkling system with a Fairbanks-Morse 6" dual-driven fire pump—capable of pumping 1500 gallons per minute. The installation is so dependable, so positive that prompt approval was given by the authorities having jurisdiction.

Don't gamble with the heart of your fire-prevention equipment; insist on F-M pumps with F-M power. See your F-M Field Engineer for expert assistance, or write Fairbanks, Morse & Co., Department CA-3, 600 South Michigan Avenue, Chicago 5, Illinois.

**FAIRBANKS-MORSE**

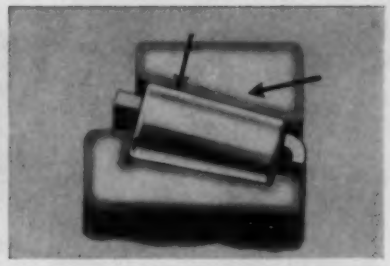
*a name worth remembering when you want the BEST*

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

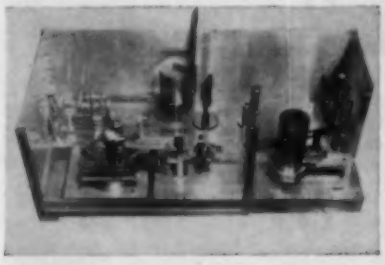
# Get all these advantages . . . specify TIMKEN® tapered roller bearings

**THERE ARE 27 TYPES** of Timken® tapered roller bearings. This wide selection means you get the bearing design exactly suited to your job. Whatever your bearing application problem, we can help solve it.

**THE SOFT STEEL CAGE** used in Timken tapered roller bearings separates the rollers, keeping them spaced evenly. This prevents scuffing of the rollers, adds to the bearing life and gives you more for your money.

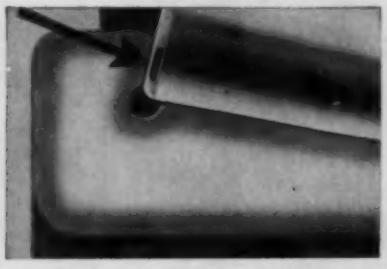


**HARD ON THE OUTSIDE,** tough on the inside. To take shock loads, give longer life, Timken bearing rollers and races are case-carburized to have a hard, wear-resistant surface over a tough, shock-resistant core.



**MICRO-INCH FINISH** is standard for Timken bearings. This profilograph checks contours and smoothness of circular surfaces to a millionth of an inch, helps us make Timken bearings truer, quieter, longer-wearing.

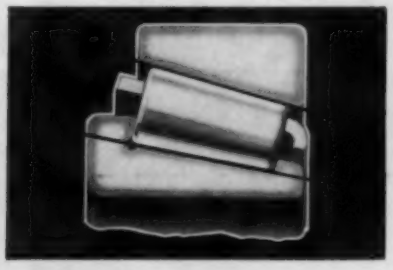
**6,525 SIZES,** the world's largest selection of tapered roller bearings. From bearings smaller than your finger to 71½" in inside diameter, the Timken Company can supply the size you need for any specific application.



**POSITIVE ROLLER ALIGNMENT** is assured because the taper in Timken bearings holds ends of rollers snug against the rib. The taper in Timken bearings lets them take radial or thrust loads or any combination.

**ACCURATE TO 50 MILLIONTHS** of an inch. This Universal Measuring Machine checks gages and machine parts used to make Timken bearings. Our gage laboratory, one of the world's best equipped, helps make Timken tapered roller bearings your No. 1 bearing value.

**WE MAKE OUR OWN FINE ALLOY STEEL.** No other American bearing maker does. This spectrometer helps control steel quality—in 40 seconds gives the exact chemical analysis of a melt. In a few minutes, results are flashed to the melter. It's another step in rigid quality control.



**FULL LINE OF CONTACT** between Timken bearings' rollers and races gives them *extra* load-carrying capacity. To get *all* these advantages, specify "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

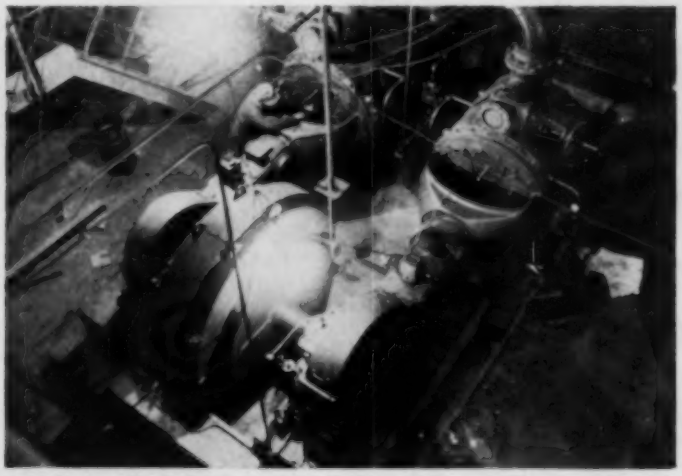
**TIMKEN** *TAPERED ROLLER BEARINGS ROLL THE LOAD*

TRADE-MARK REG. U. S. PAT. OFF.

COAL AGE

# NEWS ROUND-UP

**1.** **STARTING POINT** is Pitt Consol's Georgetown preparation plant.



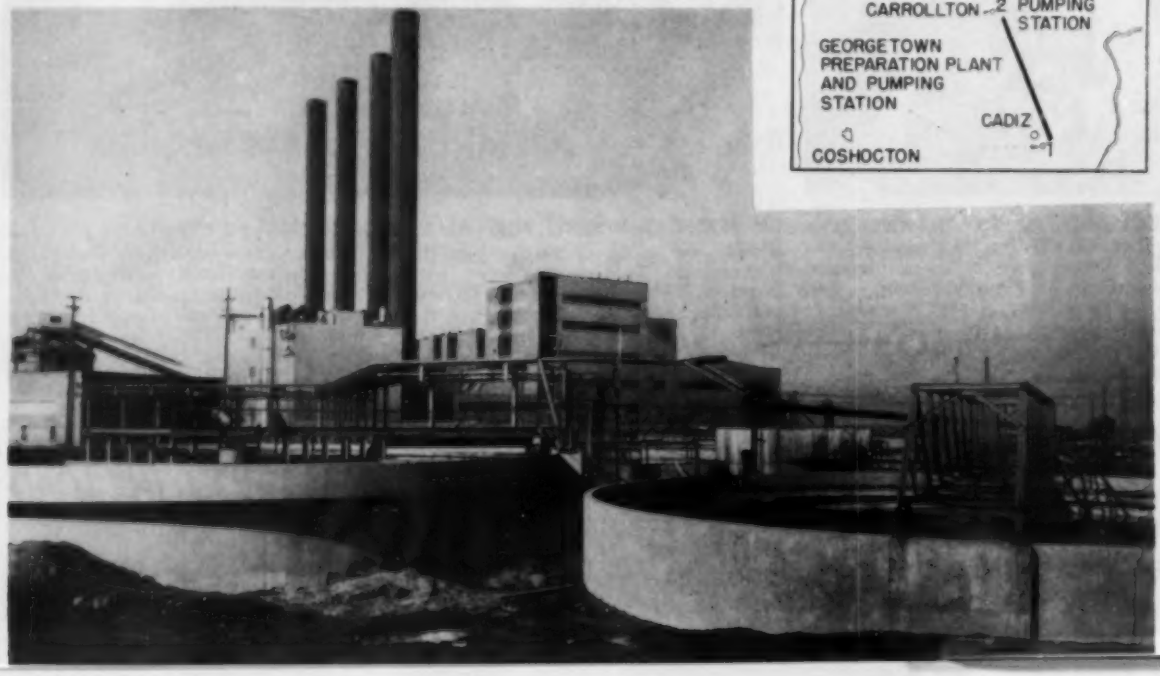
**2.** **PUMPING STATIONS** like the one above give coal slurry a high-pressure shove toward Eastlake destination.

## 108-Mi Pipeline To Move 3,500 Tpd

SQUIRMING under the increasing pressure of soaring land and sea freight charges, coal fired another gun last month in its land duel against the high cost of shipping. The new shot came from Pittsburgh-Consolidation Coal Co., which April 9 will dedicate its 108-mi coal-carrying pipeline between Georgetown, Ohio, and the Cleveland Electric Illuminating plant at Eastlake on the shores of Lake Erie.

In full operation the line is planned to move 3,500 tpd between Pitt-Consol's Georgetown preparation plant at the southern end of the line and the CEI power station at the northern end. The estimated saving in transportation charges—$1.50 per ton.

**3.** **EASTLAKE STATION,** owned by Cleveland Electric Illuminating Co., where incoming slurry is dewatered, dried, re-crushed to insure 200 mesh, and fed to furnace.



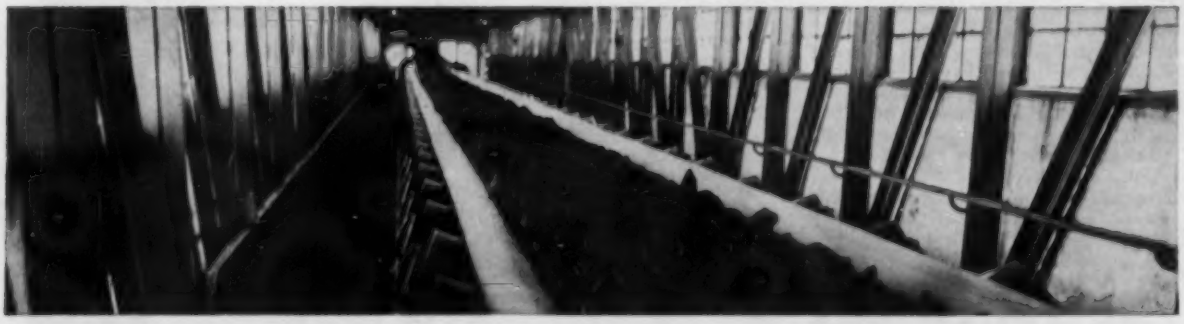
# In every phase of mining

**FOR MINE CARS AND ENGINES,** Cities Service produces a complete line of highest quality lubricants, specially tailored for rugged, dusty mine operation. Properly applied, these oils and greases can substantially cut haulage costs. . . . Mighty important when you consider these costs now run 20-40% of the total cost of a mine operation! Get the details without obligation from a Cities Service Lubrication Engineer.

# Cities Service Lubrication

**FOR STRIP EQUIPMENT,** nothing surpasses Cities Service Trojan Gear Oils and C-300 Motor Oils. Gears of world's second largest shovel undergo Cities Service treatment. Many strip miners simplify application and inventory with multi-purpose Trojan H Grease. Ideal for bearings, water pumps, all chassis lubrication.

# conveys better results!



**CITIES SERVICE OFFERS** a complete line of lubricants for maximum protection of bearings, belts, trolleys. One major conveyor manufacturer uses only Cities Service lubricants for bearings—scores of miners do the same!

## CITIES SERVICE

**A complete line of lubricants for every mining need and condition**




BUCYRUS-ERIE WALKING DRAGLINE

For strong advocates of pipelines Pitt-Consol's operation is considered a sound argument for many and more such lines—especially, they point out, with rails even now seeking a freight increase that would put rates 22% higher than they were last fall.

For those more cautious the pipeline is still an experiment—the first shot in the revolution needed to slash high transportation costs.

But, Pitt-Consol, which has invested $12 million in the line and in its three pumping stations (map), plus $2.5 million in dewatering facilities at the CEI Eastlake plant, may be planning even larger pipelines. Last year, in an annual report to stockholders, George H. Love, president, declared that the mounting costs of railroad freight rates might be countered with pipelines and barge transportation. Barge transportation has already proved itself where inland waters are nearby (*Coal Age*, October, 1956, p 60; December, 1956, p 58). Pipelines may be still another weapon for many companies in the effort to compete against piped oil and gas, and against the freightless atom.

Pitt-Consol's coal begins its pipeline trip at the company's preparation plant at Georgetown after the coal is washed, cleaned, and sized to 1 16 in. (The bulk of it actually is 100-200 mesh.) Mixed with water on a 50-50 basis the coal becomes a mush-like slurry to which is added a patented anti-corrosion material containing a chromate. In all, 3,500 tons of coal and 840,000 gal of water are pumped through each day at a rate of 3 to 3½ mph. Water for mixing the slurry is pumped from an artificially created lake at Georgetown.

Three pumping stations—one at Georgetown, one at Carrollton, and a third at Atwater—propel the slurry (map). Two men are employed at each station now, but Pitt-Consol expects that a total of only three men will be required when all bugs are eliminated.

At Eastlake the coal is dewatered and dried in a 150-tph capacity plant built by the Fairmont Machinery Co. Equipment, in the order of which it handles the coal, includes two Dorr thickeners, four vacuum filters and four Raymond flash driers. Water from the filters is clarified in a Dorrco clariflocculator with the fine coal being returned to the circuit. The water is chemically treated to purify it, and, if not used for steam making, is emptied into Lake Erie.

Pitt-Consol says that only 63 lb of non-toxic solid matter remain in 840,000 gal of water, and that the water is 99.999 pure.

Leaving the filters with a recovery of 96 to 97%, the coal contains a moisture content of approximately 20%. It is conveyed by belt to the flash driers where the moisture is reduced to 5 or 5½. Next, the coal is gravity-moved from a collector to a storage bin, then conveyed by belt to the power plant's boilers. There it receives a final grinding to insure 200 mesh fineness just before being blown into CEI's burners.

The pipeline will supply 80% of Eastlake's annual needs, or 1,250,000 tons. The remaining tonnage, approximately 350,000, will arrive by rail.

## DeKoven Dock Facilities Built To Moor 14 Barges

The DeKoven mine in Sturgis, Ky., currently is loading 14 and 15 barges a week with its new dock facilities on the Ohio River above Caseyville, Ky. Constructed by Dravo Corp., Pittsburgh, Pa., the dock is designed to receive seven loaded and seven unloaded barges.

Its 11 sheet steel pile cells rise 50 ft above normal pool level and are driven to rock. Three of the cells support a 1,000-tph loading conveyor 100 ft long that is hinged to adjust for various river levels.

Two of the cells support a mechanism that shifts the empty barges into position under the conveyor loader, then moves them along for mooring at the end of the 1,175-ft dock. Three cells at each end of the dock are used to moor both empty and loaded barges. All the cells were filled with sand and gravel, then capped with reinforced concrete during construction.

Coal from the DeKoven mine slope moves to the dock more than 2 mi on a 42-in conveyor belt. Most of the coal is bound for the Joppa Steam Electric Station, Joppa, Ill.

The first barge load of coal left the dock in mid-September. Thus far, full advantage has not been taken of the economic advantage achieved through river transportation, since the DeKoven mine is producing at about half its capacity. But by 1958, according to officials of the Pittsburg & Midway Coal Mining Co., owner of DeKoven, the mine will be turning out 100,000 tons per month. The extra capacity will be delivered to a number of consumers.

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## Mergers, Oil Industry Are Congressional Targets

As the second term of the Eisenhower administration remeshed governmental gears last month one change was becoming more and more evident. President Eisenhower was being heard less and less on Capitol Hill where a Democratic Congress was noisily banging away at big business in the United States. After four years of harmony the new tone between Congress and the administration was something less than compatible.

Generally, a two-pronged Congressional attack seemed in the making. One was aimed at "economic concentration" to show that big companies dominate their industries in both price and production policies, thus freezing out smaller companies. The other attack was aimed

**LOADING DOCK** built by Dravo Corp. for the DeKoven mine, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., rests on steel sheet pilings. The conveyor loader is hinged to adjust for various river levels. Pilings or cells, in the background are for mooring empties. Cable stretching between cells is used to shift barges into loading position.

# BUCYRUS-ERIE WALKING DRAGLINE
## moves overburden fast and far for Kentucky coal company

A Bucyrus-Erie 480-W's big capacity and long reach have materially improved stripping operations at the Riverview Coal Company, Inc., of Hartford, Kentucky, according to the owners.

Hilary Hurst, Riverview's secretary-treasurer, remarked, "At the rate the 480-W has moved dirt, we'll realize a profit on the investment in a relatively short time. After the machine's initial cost has been met, there will be plenty of coal left to be uncovered."

The machine's ability to handle large rocks has reduced the need for secondary blasting, according to company president and mine superintendent Kermit (Jim) Hurst.

This kind of profitable performance is the reason you will find Bucyrus-Erie walking draglines on high-volume earthmoving jobs all over the world. Features such as simple main machinery for year-after-year dependability . . . exclusive walking mechanism for smooth, sure moves . . . front-end design that combines strength with light weight — all have made Bucyrus-Eries outstanding performers for years.

The 480-W at the Riverview Coal Company moves up to 60 feet of overburden consisting of clay, sandstone and shale.

We will be pleased to provide you with full information on the model that's just right for your big-yardage jobs. Ten models are available with bucket capacities starting at 4 cubic yards.

124L57C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

at regulatory agencies such as the Federal Power Commission, the Federal Communications Commission, and the Securities Exchange Commission. The agencies, Congressmen charged, were showing favoritism toward the industries they regulated.

Heading the investigations of economic concentration were Sens. Estes Kefauver (D-Tenn.) and Joseph O'Mahoney (D-Wyo.), who were busy building staffs of veteran anti-trust experts. Among the experts were counsel Paul Rand Dixon, whose main legal experience has been acquired in anti-monopoly cases; John Blair, a business concentration and cartel and expert who once helped tighten merger laws; and Watson Snyder, a top anti-trust oil expert.

The result of the staff-building will be a group of men who are thoroughly familiar with government anti-trust policies, men who worked for the last Truman Administration. The predetermined aim—to show that big business influences the Eisenhower Administration and that the Administration's policies have encouraged power concentrations in business to the disadvantage of small business.

Thus far, on the immediate Congressional list are oil, steel, beef producers, the chemical industry, and autos.

Washington observers believe that the end result will be a move for legislation requiring advance governmental approval of mergers. Such legislation would eliminate the present prescribed course of taking a case to court.

Perhaps the biggest trouble piling up for any one segment of U. S. industry was in oil, although oil men themselves were sloughing off any attacks because of the paper bag quality of previous ones. But, both the Administration and Congress were threatening action last month. President Eisenhower, after publicly berating the oil industry for not delivering a quota of 500,000 bbl a day to Europe, threatened regulations. The Justice Dept. was getting set for grand jury action against domestic oil marketers. In Congress Sen. John O. Pastore (D-R.I.), as chairman of a Senate Commerce subcommittee, was raising the question of whether oil production might be a function of interstate commerce. At another desk in Congress Sen. O'Mahoney was already inquiring into the European oil program and questioning an antitrust exemption given to 16 oil companies working together to supply Europe's oil needs. Pervading much of thinking of Congressman is the question of whether there is a need for long-term controls on oil. In other words should the industry be made a public utility?

Some of the sharpest action in the anti-business concentration movement has been in steel where the Bethelehem Steel Corp. and the Youngstown Sheet & Tube Co. are going ahead with merger plans despite a looming court contest by the Attorney General. In a prepared statement Youngstown said: "The companies hope that the legal proceedings will be expedited and the question involved speedily determined by the courts." Both steel companies, after 2½ yr of talking merger, decided to test the anti-merger section of the Clayton Act.

## Utah Properties Buildup Planned by U. S. Steel

A three-pronged program to improve and expand its Utah coal properties was disclosed by the Columbia-Geneva Steel Div. of U. S. Steel. L. B. Worthington, president of Columbia-Geneva, said the division would construct a 600-tph cleaning plant near Wellington, Utah, drive an 8,700-ft rock tunnel in its Columbia, Utah, mine, and erect a general office building in Dragerton, Utah.

The cleaning plant, a multi-million dollar installation, will rise on a 1,500-

acre site 2 mi southeast of Wellington (map). From its position on the Price River and on the main line of the Denver & Rio Grand RR, the plant will process all the coal mined at U. S. Steel properties in Utah and Colorado. Allen & Garcia, Chicago, Ill., have been awarded a contract to construct the facility. Completion is expected by mid-1958.

R. M. von Storch, general superintendent of coal mines and quarries, says the cleaning plant site was chosen because of the surrounding terrain, the ample water supply, a refuse disposal area, and access to rail facilities. The plant, itself, will be similar to one built by U. S. Steel in 1955 at Corbin, Ky. At this newest operation, coal from Utah and Colorado mines will be blended, crushed, washed, and loaded into rail cars at the plant for shipment directly to the Geneva Works' coke ovens. Although a large amount of water will be used, Columbia-Geneva will be practicing conservation by recovering and recirculating more than 95% of the water it uses.

The division's rock tunnel will be 13 ft wide, 9 ft high. It will be driven from the level of the Columbia mine tipped to intersect the mine's working seam at a point 5,000 ft down a pitch from the coal outcrop. When finished the tunnel will eliminate a 500-ft mine portal grade that is required to haul coal from the face.

As work proceeds on the rock tunnel, the Columbia mine tipple will be modified to include automatic coal dumping and better screening and picking facilities. In addition, an equipment maintenance shop will be built near the entrance to the rock tunnel.

The new office building in Dragerton will be constructed with steel frames and masonry walls. A 40x172-ft structure designed by American Bridge Div., U. S. Steel, the building will be air condition. Its construction was scheduled to begin last month.

U. S. Steel's Columbia-Geneva Div. operates the Geneva mine in Horse Canyon, Utah, and the Columbia mine, Columbia. In 1955 the Geneva mine produced 682,000 tons. In 1956 tonnage rose to 859,468 tons. A similar rise in tonnage occurred in the Columbia mine where 398,000 tons were mined in 1955. In 1956 the figure rose to 531,040. Combined, the two operations produced 1,080,000 tons in 1955, 1,390,508 tons in 1956.

## 37 Die As Explosion Shakes Bishop Mine

Thirty-seven miners died Feb. 4 as an early morning gas explosion shook Pocahontas Fuel's giant Bishop mine on the Virginia-West Virginia border. The disaster was the worst since Dec. 21, 1951

**CARAVAN OF MINE CARS** enroute to Clinchfield Coal Corp., Dante, Va., is part of a 180-car order for medium height cars. Units have a 9-ton capacity and were manufactured by the Differential Steel Car Co., Findlay, Ohio.

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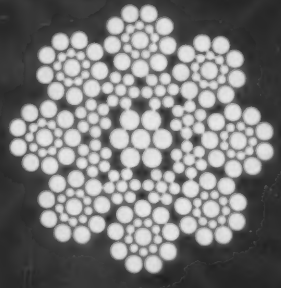
If you're operating where loading, shock and fatigue are severe, chances are J&L CenterFit can help you cut your wire rope costs. Contact your nearest J&L Office or representative.



**Jones & Laughlin**
STEEL CORPORATION
Wire Rope Division, Muncy, Pa.

when 119 men died in a blast at West Frankfort, Ill.

More than 180 men were underground when the explosion occurred at 1:55 a.m. Inside the mine the blast seemed almost gentle. Charles Vaughan, Bluefield, Va., said he "heard it, but it wasn't loud at all." Another survivor described the blast as a "big puff of wind." Later, rescue workers said they believed that a lack of oxygen rather than the force of the explosion killed the 37 men. Other evidence bore this out. The last words received from the trapped men came from Raymond Owensby, who said his section would be alright if smoke and fumes would abate. But Owensby perished on a spot described as "a five-minute walk" from the Bishop mine's elevator shaft.

An hour after the explosion, at 3 a.m., a rescue worker discovered the first of the dead. The worker reported that no barricades had been built and that no notes had been found.

As rescue operations got underway relatives and friends gathered at both entrances—in West Virginia and Virginia. At mine headquarters William A. Fullarton, special assistant, said it was believed that an accumulation of gas had caused the explosion. What had touched off the gas was unknown, he said.

Rufus Trail, a motorman who had hauled the men into the mine, said that a miner below had telephoned to report a heavy accumulation of dust.

By 9:30 a.m. relatives and friends of the victims received the final blow to already waning hopes. In a statement issued by Pocahontas Fuel and the West Virginia Dept. of Mines, officials announced that "less than 40 of the men were involved in the explosion, and of this number there are no survivors."

Later, Virginia and West Virginia mine safety officials were joined by Marling J. Ankeny, Bureau of Mines director, for a check on the cause of the disaster.

The last bodies were discovered at 5 p.m. on the day of the explosion, or 15 hr after the blast. By 5:50 p.m. 12 mine cars, moving from the mine's drift entrance across the West Virginia line, carried the victims to a company building where doctors began the job of establishing identities and making examinations. All the dead had been working in the vicinity of the blast.

Bishop is one of Pocahontas Fuel's major operations. It underlies the Virginia-West Virginia border for about 5 mi, and has been in operaion since 1927. In 1956 it produced 2,105,822 tons of coal.

### Preparation Facilities

**U. S. Steel, Alpheus Plant, Gary, W. Va.**—Contract closed with the Deister Concentrator Co. for 32 SuperDuty diagonal deck No. 7 coal washing tables and three Concenco revolving feed distributors.

**Richland Coal Co., Barbourville, Ky.**—Contract closed with Wilmot Engineering Co. for one 5-ft Hydrotator and one 4x10 dewatering screen for 5 tph of ⅞x⅜ stoker coal. Equipment is an addition to existing plant.

**Island Creek Coal Co., Red Jacket No. 17, Red Jacket, W. Va.**—Contract closed with Wilmot Engineering Co. for four No.77 double deck tables to clean 80 tph of ¼x0 coal. Equipment is an addition to the present plant.

**Premier Pocahontas Co., Herndon, W. Va.**—Contract closed with the Eimco Corp. for a 6-ft Dx6 disc Agidisc special coal filter. Filtration system will be fed by 8-in cyclones. Approximately 5 tph of solids will be removed by the cyclones and filtration system, which will close the circuit and eliminate plant bleed to conform with a state anti-pollution requirement. Probable completion date, October, 1957.

## Glen Alden Directors In Acquisition Wrangle

Overriding the opposition of Francis O. Case, president, and Gilbert S. McClintock, chairman of the Glen Alden Corp., a majority (four) of the company's board of directors prepared last month to go ahead with plans to purchase the Maremont Automotive Co.

Stockholders will be asked to consider the acquisition March 12.

Mr. McClintock and Mr. Case are strongly opposed to the purchase because Glen Alden would assume liabilities of $4,266,000. They also object to adding five Maremont directors to Glen Alden's seven-man board, a move that would boost the board member total to 12.

Under general terms of the acquisition Glen Alden would acquire, through a specially-created subsidiary, the major physical assets of Maremont for approximately $3,409,000. The price would be met by paying 250,000 shares of Glen Alden stock and $909,000 in cash. The stock's value for the transaction would be set at $10 a share.

Mr. Case and Mr. McClintock oppose the payment of Glen Alden stock for the $10 a share price since the $10 figure, they say, "is several dollars per share below present market value."

"Maremont," the two men said in opposition to the purchase, "is not entitled to five directors out of 12 on the Glen Alden Board. Under such conditions, Maremont would control both the Maremont and Glen Alden boards. Such an eventuality could adversely affect our anthracite business just at the time it is recovering from several difficult years."

Later last month, the two men said in a letter to stockholders, "We believe that the cost of this acquisition, both directly and through the proposed newly formed subsidiary, is far beyond the value to be derived by our stockholders from Maremont's income."

Maremont's income is one of the chief talking points being used by proponents of the acquisition. Maremont, they say, will improve Glen Alden profits. They point out that Glen Alden earnings in 1956 are estimated at $1.3 to $1.5 million. Maremont's 1956 earnings, they assert, would have increased Glen Alden's net after taxes by $2 million, if Maremont had been in the Glen Alden fold.

Four other points are made by proponents: 1) The acquisition represents a major step in Glen Alden's diversification program; 2) It adds substantial assets; 3) Maremont's management will provide additional strength and depth in Glen Alden's organization; 4) Glen Alden will benefit from the business experience of the five Maremont officials to be added to Glen Alden's board.

Glen Alden directors favoring the purchase are Glover Johnson, a partner of White & Case, New York attorneys; Frank J. Manheim, a partner in Lehman Bros., New York investment bankers; William W. Scranton, a Scranton, Pa., investor; and John R. Simpson, president of the 3d National Bank & Trust Co., Scranton, Pa.

Mr. Case and Mr. McClintock oppose the purchase. The seventh director, Wentworth P. Johson, voted to defer any recommendation to stockholders until the condition and future outlook of Maremont had been studied by a recognized industrial management company.

### Bituminous Output

| YEAR TO DATE | PRODUCTION |
|---|---|
| Feb. 16, 1957 | 65,236,000 |
| Feb. 18, 1956 | 70,820,000 |

1957 output 7.9% behind 1956.

A month earlier output was 12.1% below 1956.

| WEEK ENDING | PRODUCTION |
|---|---|
| Feb. 16, 1957 | 9,750,000 |
| Feb. 18, 1956 | 10,050,000 |

### Anthracite Output

| | |
|---|---|
| Feb. 16, 1957 | 3,325,000 |
| Feb. 18, 1956 | 4,192,000 |

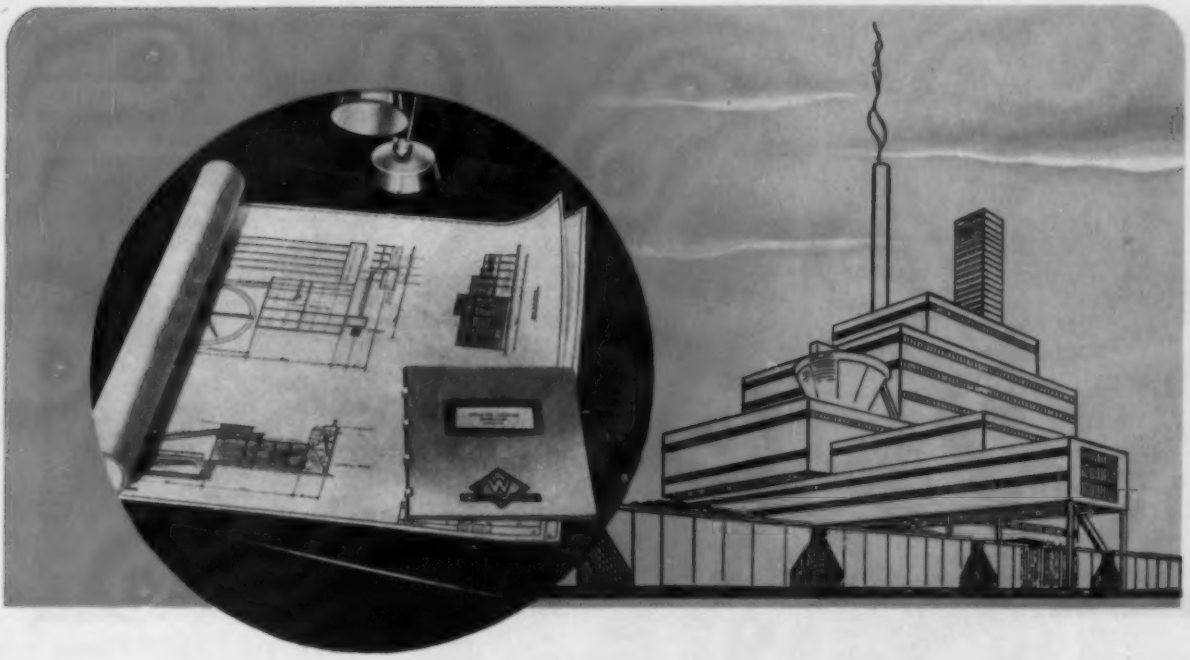
1957 output 20.6% behind 1956.

A month earlier 1956 output was 30.1% below 1956.

| WEEK ENDING | PRODUCTION |
|---|---|
| Feb. 16, 1957 | 376,000 |
| Feb. 18, 1956 | 506,000 |

## Roof Falls, Haulage Lead 1956 Death Toll of 443

The U. S. Bureau of Mines reports that 443 mine workers died last year in the nation's coal mines and that an estimated 19,300 were injured. The death toll was 26 higher than 1955's 417



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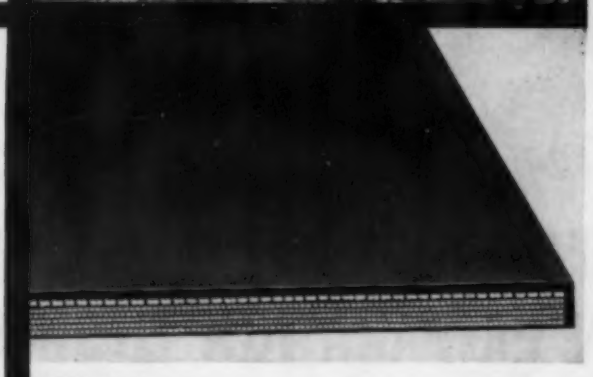

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*Pittsburg, California.*

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H. K. PORTER COMPANY, INC.

## News Roundup (*Continued*)

fatalities. The number of injuries, however was 410 less than 1955's 19,710.

Marling J. Ankeny, U. S. Bureau of Mines director, has called for greater vigilance on the part of miners and operators to combat "a rising trend" in coal mine deaths. "Increasing activity in the coal industry," Mr. Ankeny said, "has brought increased danger."

Bituminous operations recorded 388 fatalities last year. Roof falls and haulage accounted mainly for an increase of 31 fatalities over 1955. In anthracite 55 miners were killed compared to 60 in 1955.

In the national pattern roof and face falls claimed more than half the year's toll. They crushed 244 miners out of the 443-man total. In 1955 roof falls caused 228 out of the 417 fatalities.

In haulage accidents 90 lives were lost—77 underground, 12 at surface operations, and 10 at strip mines.

The highest monthly toll of the year occurred in January when 57 men died. The number of January fatalities was the highest in 4 yr. The lowest monthly toll was 28 deaths in December.

# News Briefs

**Johnstown Coal & Coke Co. is installing a new cleaning plant and additional underground equipment at its Crichton No. 5 mine on the Williams River in Webster County, W. Va.**

Costs are expected to be approximately $1 million. A Roberts & Schaefer dry-cleaning plant will be installed to process ⅜x0 slack coal. With the new facility the Williams River tipple will have an overall capacity of 320 tph. Crichton No. 5 produces 3,000 tpd. Situated 10 mi east of Cowen, W. Va., the mine is served by the Baltimore & Ohio RR. The company's long-range plan for improvements includes the recent construction of a new portal building at the mine.

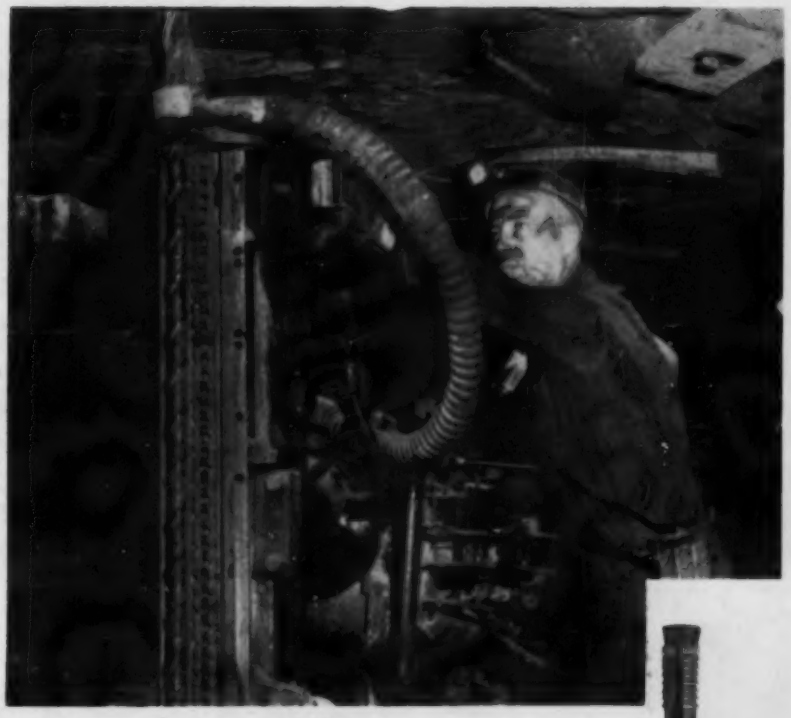
**Hundreds of acid-containing strip mine ponds in Southern Illinois may produce desirable fishing, according to the Southern Illinois University Cooperative Wildlife & Fisheries Laboratories.**

In a report based on a three-year wild life research project near Pinckneyville, the SIU investigators say that strip-pond acid "may be a blessing rather than a curse" in controlling fish population growth. One pond containing a pH reading of 3.5 was found to contain an all-adult fish population. Previously, a reading under 5.1 was regarded as deadly. As a result the SIU researchers have begun treating acid lakes with hydrated lime and fertilizer to test growth patterns and fish population adjustments. The study is being carried out on land donated by the Truax-Traer Coal Co. and is designed to produce ways of managing and developing coal-stripped areas for better hunting, fishing and recreation. Cooperating, too, is the Illinois Coal Strippers Association.

# Personal Notes

**Norman E. Kelb,** a member of the Ayrshire Collieries board for 6 yr, was elected president of the company Feb. 14. He succeeds James W. Morgan, who died Feb. 1. Mr. Kelb, 63, is an Indianapolis businessman with interests in a number of companies. He is president of Cumberland Quarries, Inc., president of the High Point Oil Co., and president of the Eel River Mining Co. He also holds the post of vice-president of the St. Paul Quarries, Inc., and is a director of Republic Coal & Coke Co.

**Roland C. Luther,** president of Peerless Coal & Coke Co., was elected a vice president of Pocahontas Fuel Co. at a recent meeting of Pocahontas directors. Mr. Luther will continue as president of Peerless, which was acquired last September by Pocahontas Fuel as a wholly owned subsidiary. His office will be moved from Bluefield, W. Va. to Pocahontas. Mr. Luther moved from Pottsville, Pa., to Bluefield in 1936. He has been an active member of the coal

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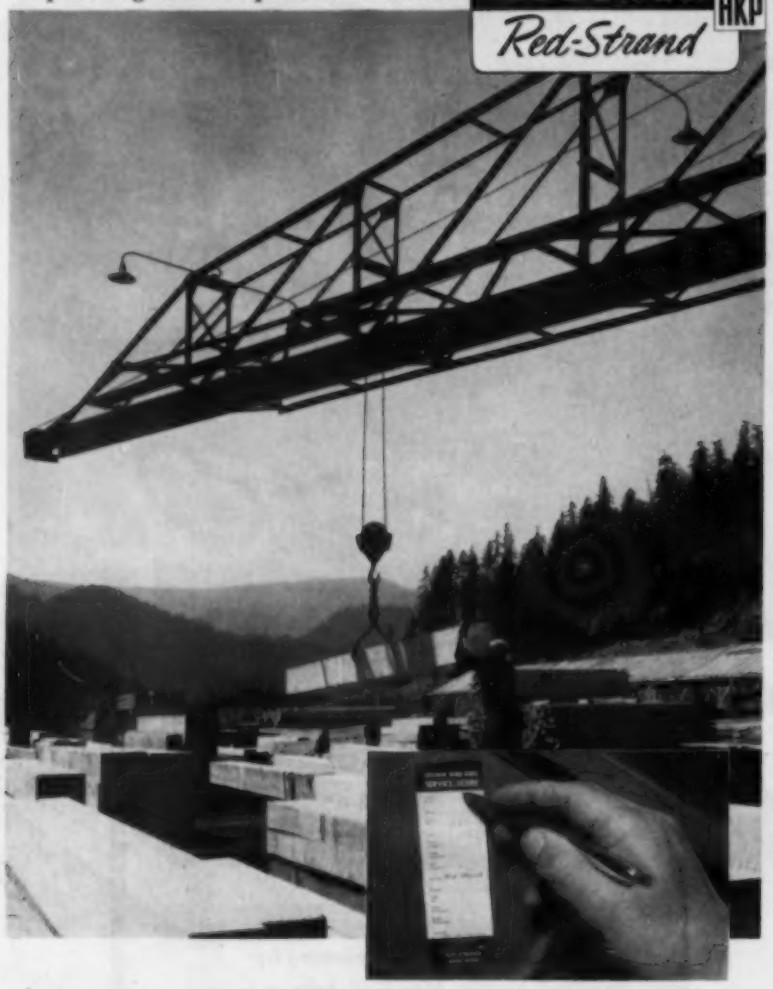

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Service-Score Stickers are available from any Leschen field man or distributor. Just ask, or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.

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H. K. PORTER COMPANY, INC.

## Personal Notes (*Continued*)

industry for many years. At present he is treasurer and a member of the executive committee of the Pocahontas Operators Association. He was elected president of Peerless in 1956 during the Company's annual meeting.

**William P. Young,** president of the Bell & Zoller Coal Co., retired March 1. Mr. Young had been associated with the company for 35 yr. A one-time superintendent of B&Z's Crescent properties in Peoria, Ill., he was elected vice president and general manager in 1937. In those capacities he was in charge of B&Z operations and Centralia Coal Co. operations. In 1942 Mr. Young was elected president of B&Z after the death of the company's former president, G. Donald Cowin.

## Obituaries

**Joseph F. Joy,** 73, founder of the Joy Mfg. Co., died Feb. 19, at his home in Fort Pierce, Fla. Mr. Joy, whose machine design revolutionized the mechanical loading of coal in the United States, began his experiments in mobile loading in 1916. In 1919 he organized the Joy Mfg. Co. and began production of coal mining machinery. Principal pro-

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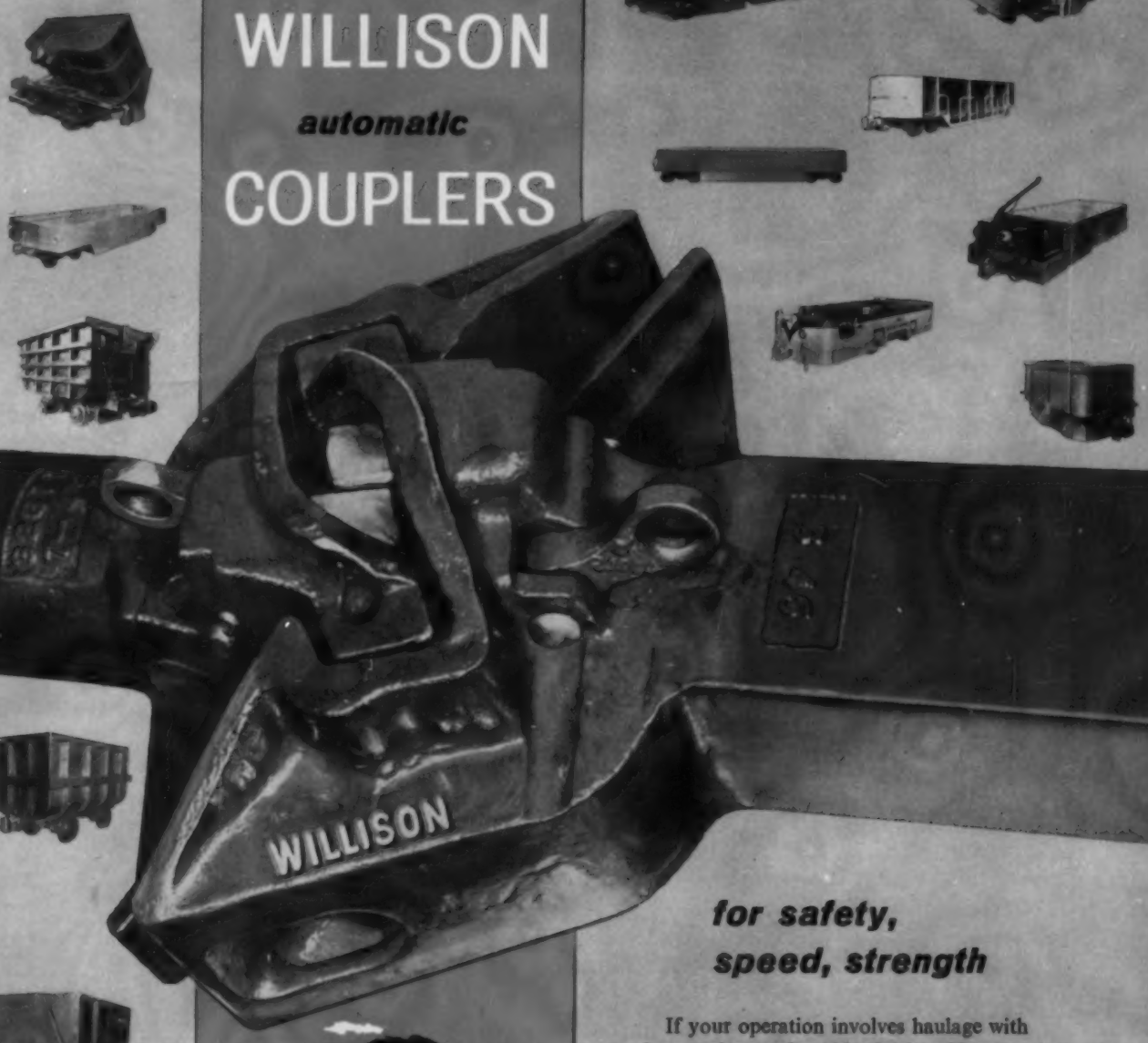


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## Obituaries *(Continued)*

duct was the Joy loader. From 1925 to 1927 Mr. Joy served as a consultant to Russia during modernization of USSR coal mines. He returned to the United States to organize Joy Bros, Inc., Marion, Ohio., where he produced, among other equipment, the coal saw and the safety drill. Later, Mr. Joy joined the Sullivan Machinery Co. as head of design. Specializing in cutters, he developed the 7AU, which was the parent of many of the universal machines now in service. From 1938 to 1940 Mr. Joy was senior ordnance engineer with the War Dept., Washington, D.C. On completion of government service he returned to private industry and was retained by the Joy Mfg. Co. as a consultant. Three years ago he moved to Florida because of failing health.

**James W. Morgan,** president of Ayrshire Collieries Corp., Indianapolis, Ind., died Feb. 1 in New York's Memorial Hospital. His death followed an illness that began in June, 1956.

Mr. Morgan attained Ayrshire leadership in May, 1950. He was elected president after serving Ayrshire as vice president and general manager for less than a year. Before joining Ayrshire he had been associated with the Truax-Traer Coal Co. and had been in charge

James W. Morgan

of the company's West Virginia operations.

Mr. Morgan began a career in coal in 1921, soon after being graduated from Lehigh University. As an employee of the Lilly Coal Co., Lilly, Pa., he advanced from clerk to foreman to superintendent during the years 1921 to 1924. In 1924 he joined C. A. Hughes & Co., Cresson, Pa., where by 1932 he began serving the company as vice president and treasurer. He remained associated with the company until 1948 when he joined Truax-Traer.

**Robert M. Medill,** 74, former Illinois Director of Mines & Minerals, died January 27 in Steamboat Springs, Colo. A native of Oglesby, Ill., Mr. Medill began a career in coal at the age of 16 with a job in a mine at Wenona, Ill. Later, he operated mines in Illinois, then joined the Peabody Coal Co. where he rose to the rank of superintendent. Mr. Medill served as director of the Illinois State Mine & Minerals division twice. His first term encompassed the years 1920 to 1923, his second the years 1940 to 1949. His second resignation hinged on the Centralia mine explosion in which 111 men were killed.

### MEETINGS

AIME, Annual Meeting, Feb. 25-27, Roosevent and Jung Hotels, New Orleans, La.

Bituminous Coal Research, Inc., April 18, 19, Greenbrier Hotel, White Sulphur Springs, W. Va.

2nd Annual Appalachian Underground Corrosion Short Course, June 4-6, West Virginia University, Morgantown, W. Va.

National Coal Association, Annual Convention, June 4-6, Hotel Shoreham, Washington, D.C.

International Briquetting Association, Biennial Conference, Aug 19-21, Colorado Hotel, Glenwood Springs, Colo.

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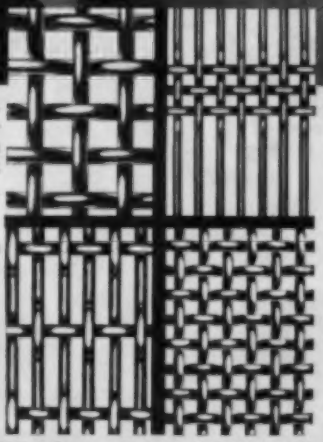

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The 516 MT has long been a favorite with coal miners. It can raise 5½ tons as much as 9½ inches, is only 16 inches high when closed and has the famous oblong rack bar for greater strength and dependability.

A ratchet jack such as the Duff-Norton all-purpose 516 MT is no stronger than its rack bar—the notched steel bar which moves up and down supporting the load. The forged-steel rack bar on this five-ton capacity mining jack is stronger than the rack bar on any other make. *It's stronger because it's larger.*

Even a brief examination of the jack will confirm the truth of this statement, for the bar on Duff-Norton jacks is oblong, while that of other makes is square.

Ask your distributor for information on Duff-Norton coal mining jacks—there is a Duff-Norton jack for every pulling, pushing or lifting job in the mines. Or, write the world's oldest and largest manufacturer of lifting jacks for a copy of AD-10-J, "A Handy Guide for Selecting Duff-Norton Mine Jacks."

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# LETTERS

Pikeville College
Pikeville, Ky.

EDITOR
*Coal Age*

Dear Sir,

I have read in the January 1957 *Coal Age* "Financial Aid to Higher Education" with a great deal of interest, and wish to commend you for its publication.

Those of us who are in the private colleges are deeply indebted to industry for its increasing interest in the colleges of the nation. It seems to me that industry would have two very definite interests in the independent college. One is the very independence of the colleges, which is in keeping with the philosophy which has made America great. The second is the actual saving to taxpayers. If the state of Kentucky alone had been required to care for those who were enrolled in private colleges last year, the additional cost to the taxpayer would have been between $7 million and $8 million.

We believe that something new is being done here in eastern Kentucky. During this past year, the directors of the Big Sandy Coal Operators Association recommended that members of the organization assess themselves 2 mills per ton on production and contribute that amount to Pikeville College. Several coal companies have done this. We believe that it is new in that companies have voluntarily taxed themselves to support a private college.

**A. A. Page,**
President

Kingston, Pa.

EDITOR,
*Coal Age*

Dear Sir,

In the February number you carried the story of the seizure by the Mayor of Scranton of our Diamond Colliery mine, stating that the seizure was based on damage to a number of homes by cave-ins.

I trust that you will carry in your next issue the report that the inspection of the mine by the city engineer and other independent engineers revealed that there was no damage caused by our mining and that the mining was being done 'in a good workmanlike manner.'

We did not file maps under the Fowler-Kohler Mine Cave Act of 1921 because we were mining under surface which we own and for the further reason that in our opinion the act has been declared unconstitutional by the United States Supreme Court.

I am a recent addition to your list of subscribers.

Very truly yours,

F. L. Pinola,
Secretary,
**Diamond Colliery Co.**

# ACME MINE COMPRESSORS–

## *Rugged • Dependable • Maneuverable • Self-Contained*

## ...and VERSATILE

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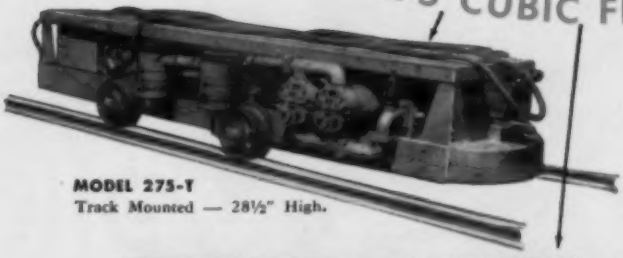

**MODEL 275-T**
Track Mounted — 28½" High.

**MODEL 275-S**
Low Coal Special — 29" overall — Less if it is to be mounted in a carrier.

**MODEL 275-SPRHS**
Rubber Mounted — Self Propelled. Two stoper Jumbo Arms with stopers and dust collectors — 34½" high with 9" ground clearance.

**MODEL 275-TD**
Track Mounted — 2 Drifter Jumbo Arms and Heavy Duty Drills for Rock Work. Arms may be interchanged with stoper Jumbo Arms.

One of these machines will fit YOUR mine conditions.
Variations such as with or without cable reels, variable ground clearance, seats, etc. are available. Full hydraulic drive and steering. Parking and tramming brakes.

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We will be glad to demonstrate in YOUR mine.

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# Foreign News

## EUROPE

Output of coal in Europe in 1956 broke all previous records, the Economic Commission for Europe disclosed last month. Provisional figures compiled by the UN institution for the past year indicate total European output reached 622 million metric tons, excluding an estimated 429 million tons USSR production, or some 1,500 million tons including the USSR. The previous record figure, in 1955, was 616 million metric tons, plus 391 million tons for the USSR. Earlier peaks of coal production were 609 million tons in 1954 and 607 million in 1929.

The greatest absolute increases in hard coal production in 1956, based on the calendar year, as compared with 1955, took place in Western Germany where 134.4 million tons was mined in 1956 against 130.7 million in 1955. Poland mined 96 million tons against 94.5 million, Czechoslovakia mined 23.5 against 22.1 million tons.

The only other major coal-producing country to increase its output in 1956 was the United Kingdom where an additional 0.4 million tons was extracted. In all other countries (Belgium, France, Saar, the Netherlands, etc.) output remained stationary or fell slightly.

The increase in output of 6 million tons over 1955 (1%) failed, however, to meet the increased demand for coal in Europe. Thus, imports had to be raised substantially.

Imports from the USA amounted to 38.4 million metric tons, an increase of 13.7 million tons over the 1955 total of 24.7 million. The imports were an all-time peak breaking the previous record of 37 million tons in 1947.

Principal importers of United States coal in 1956 were: Western Germany (11.6 million tons, against 7 million in 1955), Italy (6.5 million tons v. 5.6 million in 1955), France (6.1 million tons v. 0.8 million in 1955), the Netherlands (4 million tons v. 1.5 million in 1955), Belgium (2 million tons v. 0.8 in 1955) and Austria (1.9 million tons v. 1.3 million tons in 1955). The biggest relative increase took place in France.

In Western Europe alone imports of hard coal from overseas and eastern and western European countries totalled 84.7 million tons in 1956, compared with 82.5 million tons in 1955.

There are important fluctuations not shown by these global figures. First, imports from all sources except the USA and the USSR declined. Second, the amounts exported by each country changed considerably. Belgium, for instance, exported 5.2 million tons in 1956, or 2.4 million less than the preceding year, the United Kingdom exported only 8.2 million tons, as against 11.6 million in 1955.

Quantitatively, the largest hard coal importer in 1956 was Western Germany (18.7 million tons v. 16 million tons in 1955). Then came France (17.1 v. 11.2), Italy (10.9 v. 10.4), the Netherlands (9 v. 8.1), the United Kingdom (11.7 in 1955 but only 5.3 million tons in 1956) and Belgium (4.8 million tons in 1956 v. 3.7 in 1955).

## GREAT BRITAIN

The National Coal Board's B. Winning Colliery in Blackwell, Derbyshire, England, is installing an underground coal plough that is remotely controlled. The machinery is experimental, but may be the forerunner of automation in Britain's coal fields, according to the NCB's production manager in the area, T. Wright, who envisages complete automation in the fields with no men working at the coal face. The new experimental machinery ploughs out coal, which is loaded and hauled to the surface. The operation is controlled by an operator who is up to 100 yd away from the face.

A special Dutch drilling machine which reportedly traces leaks more quickly than any other method is being used in Swadlincote, a Derbyshire mine. The machine drills small holes in a roadbed, then draws off an air sample from beneath the surface. The presence of gas is indicated on a dial.

Experiments in "piping" coal from one point to another have been completed successfully at the National Coal Board's Markham Colliery near Chesterfield in England. The coal is carried through large diameter pipes by water pressure. Coal at Markham Colliery has been transported from pithead to washing plant by the method. Eventually it is planned to lift coal from the face to the surface at a rate of 150 tph.

## HUNGARY

The brutality and terror spread by Hungary's Kadar regime have resulted in a steady increase in Hungarian coal production since mid-December. The highest output reported thus far, 51,480 metric tpd, was reached January 24. The tonnage was approximately 50% of pre-rebellion production.

But, three factors are expected to hold down any new large increases in production. The first and most immediate is damage in the mines. This will probably be overcome, but overcome slowly, since the damage has been wide-spread. The second factor, one which the Kadar government may not resolve very quickly, is the passive resistance of the miners. They will do little to assist the government. The third factor is the recent attempt to fill the jobs of defecting miners with men from other industries, a move that has resulted in a rapid increase of "miners"—from 30,000 to 80,000—and accounts for the increased daily tonnage.

Meanwhile, the government continues to blame miners for much of the country's economic difficulties. Sandor Czbttner, Heavy Industries Minister, charged

# colder weather? hotter prospects!

- **FREEZE PROOF**—Permatreated coal resists freezing and eliminates frozen car pockets.
- **DECREASE WATER ABSORPTION**—Permatreated coal repels water.
- **REDUCE MOISTURE**—Add 300,000 BTU per ton for each 1% reduction in moisture.
- **AVOID CORROSION**—Non-corrosive Permatreat can't pit or corrode stoker equipment, or rolling stock.
- **ELIMINATE WINDAGE LOSS**—that results in lost weight claims and air pollution complaints.
- **DUST PROOF—ODORLESS**—Permatreated coal insures dustless deliveries and handling, odorless storage and burning.
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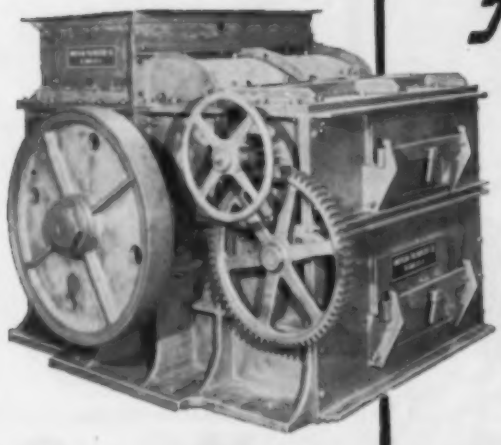
- **CONTROL BULK DENSITY**—Permatreat insures uniform coke production and quality.
- **ASHLAND PERMATREAT COAL SPRAY**—Lasts the life of the coal.
- **SPECIAL ADVISORY SERVICE**—Available from nationally recognized authorities on coal treating.

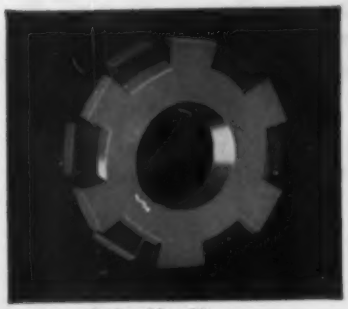
**ASHLAND OIL & REFINING COMPANY**
**Ashland, Kentucky**

Ashland PERMATREAT

# BETTER COAL CRUSHING CONTROL BECAUSE IT'S BUILT BETTER . . .

American ROLLING RING COAL CRUSHERS





**1 Patented Shredder Ring**

American-originated feature that splits coal instead of smashing it—for uniform sizing, minimum fines. Result: Americans run at slow speeds, with savings in power and maintenance. No cams, shear pins, toggles.

**2 Heavy-Ribbed Steel Frame**

Bearing pedestals are cast integrally with lower side frames. Sectional design for easy dismantling . . . abutting joints accurately machined and bolted together for dust-tight fit.

**3 Completely Lined Crushing Chamber**

Heavy, renewable liners . . . sectional for easy plate-at-a-time replacement . . . engineered to offer life-time protection to the frame.

**4 Complete Accessibility to Adjustment and Parts**

All adjustments external—even with crusher in motion. Rotor easily reached by removing top section. Rings readily reversed or replaced. Liners quickly reached, too, for periodical inspection.

**WRITE for Coal Crushing Bulletin**

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE. • ST. LOUIS 10, MO.


## Foreign News (*Continued*)

in January: "The counter-revolution has undermined the work morals of the miners. Present day Hungary has only ⅓ of the pre-October labor force, i.e., between 30,000 and 35,000 miners."

## FRANCE

Imports of United States coal in 1957 are expected to total 8.5 million tons against more than 6 million tons last year, according to officials of the French government's coal importing agency. Total French imports during the year are expected to exceed 19 million tons against nearly 18.5 million tons in 1956. The rise is attributed to an industry switch from oil to coal after the Suez hostilities. Imports of British coal in France are expected to fall further than last year when 750,000 tons were imported compared to 950,000 tons in 1955.

Soviet Russia is sending France 250,000 tons of anthracite during the first half of 1957, according to the French coal importing agency ATIC. The agency says that a new contract provides for an increase of $5 a ton FOB on the price paid for the 612,000 tons supplied by the Soviet Union last year. The new price level was not disclosed.

## SPAIN

Spanish coal production in 1956 was 16 million tons, according to preliminary estimates. Present needs, however, are 17 million tons, a figure that by 1960 will be 20 million. Imports under the United States economic aid program, electrification of additional segments of the nation's railroads, and the conversion of fuel firing equipment from coal to fuel oil have contributed to easing Spain's shortage of coal. But against all this there is a growing demand for coal by Spain's developing iron and steel industries. One problem holding down any great increases in production is a scarcity of skilled workers. Many miners are attracted by better wages and living conditions abroad. Athough some of the mining companies are trying to correct and improve working conditions, modernization and mechanization is hampered because the purchase of new equipment requires foreign exchange.

## JAPAN

Japanese coal mines produced 46,515,000 tons in 1956 compared with 42,420,000 tons in 1955. Deliveries during 1956 moved to 47,456,000 tons, a postwar record and 2,376,000 tons above the previous high in 1951. The Japanese Ministry of Trade said the increased output occurred because requirements for coal in industrial production had increased. Another reason was the consumption of coal for thermal power generation had increased "substantially." But, despite increased output a shortage of coal is expected in the next few months.

# ½ DAY LOST IN 8 YEARS

## Since he switched to GM Detroit Diesel Power

Working up to 9 hours a day, 6 days a week, in Robert Bailey's strip mine near Morrisdale, Pa., this General Motors Detroit Diesel-powered Bucyrus-Erie shovel has had total down-time of only *one-half working day in 8 years' operation.* Because of the dependable service and economy of this "6-71" engine, Bailey swung to GM Detroit Diesel power—now operates 9 units on generators, in tractors and in another shovel.

Does it pay to standardize on GM Detroit Diesel power? It sure does. For it simplifies your servicing and parts requirements. And, with power at *every* piston downstroke, these fast-stepping 2-cycle Diesels get more work done at less cost on any job.

You can have GM Detroit Diesel power (single engines, 30 to 300 h.p.; multiple units, up to 893 h.p.) in over 1,000 different applications of power machinery. For the list, see your GM Detroit Diesel distributor or dealer—or write us direct.

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Engine Division of General Motors
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Factory Engineered Parts—
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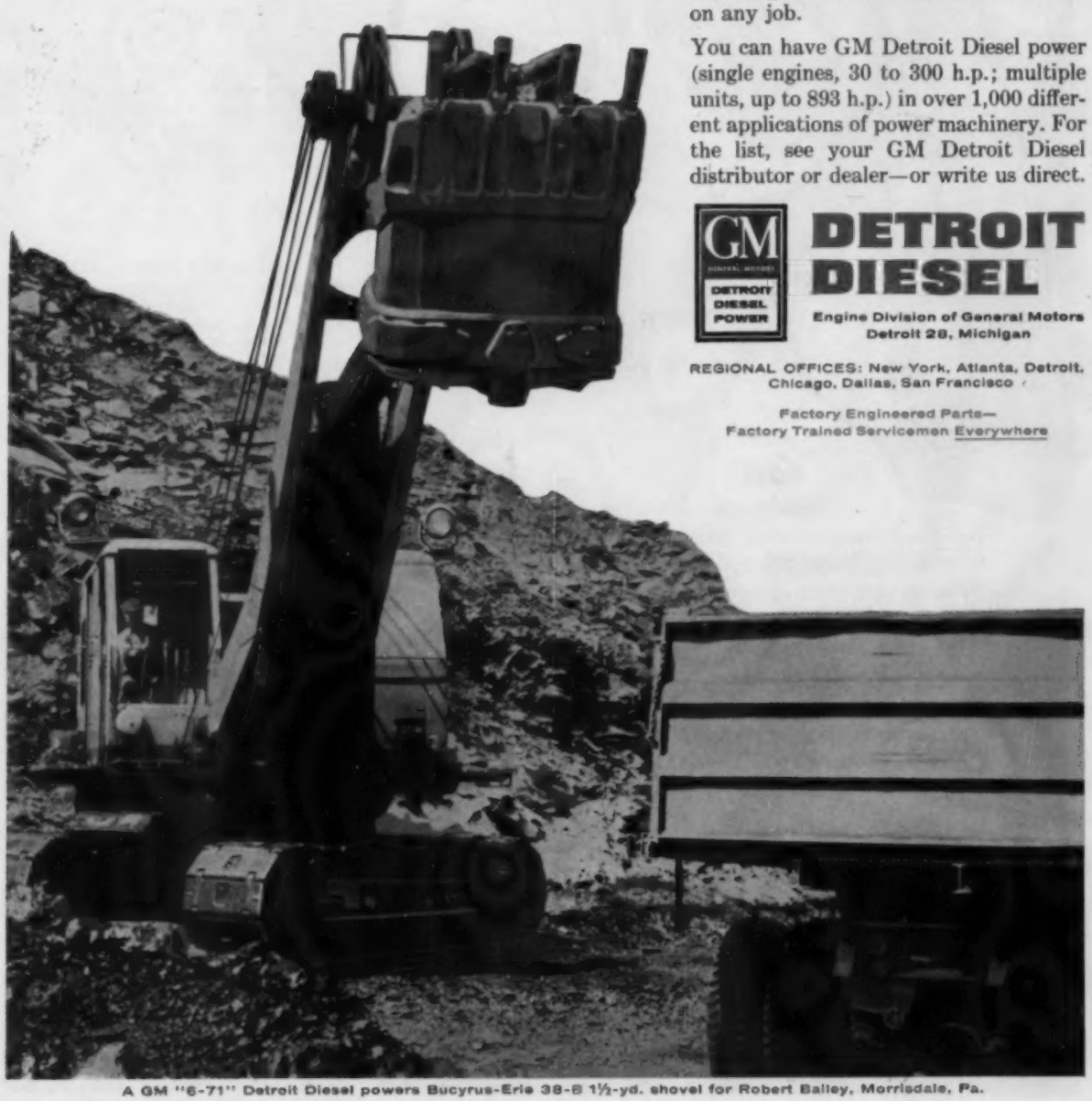

A GM "6-71" Detroit Diesel powers Bucyrus-Erie 38-B 1½-yd. shovel for Robert Bailey, Morrisdale, Pa.

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## Foreign News *(Continued)*

### USSR

The Moscow radio last month reported that Soviet coal output in 1956 had risen to an all-time high of 430 million metric tons, or about 40 million metric tons more than were mined in 1955.

The increase was attributed to the introduction of new technical equipment, rather than new mines being opened, although a total of 66 new mines and stripping operations were being developed in 1955. The Soviets say that the greater part of the new mines will be fully mechanized. By 1960 the Soviets expect to be mining 600 million metric tons.

### INDIA

A team of Soviet mining men has reported to the Ministry of Production in Delhi that India's Korba coal fields in the central region of the country can be developed to yield a minimum of 4 million tons annually by 1960 or 1961.

The team says it has been authorized to promise that Russian equipment would be available by 1958 and 1959. Operations are already underway in the Korba area.

### ITALY

The Italian steel industry, which says it receives only 15% of its coal needs from Germany's Ruhr versus 60% in 1952-53, has applied to the High Authority of the European Coal & Steel Community for rationing. The present situation has compelled the industry to buy from the United States at a price $7 to $8 more per ton than European coal. Last year Italy bought 1.7 million tons from the United States, 450,000 from Germany.

## Current Coal Patents

By Oliver S. North

**Tool carrying chains for use on coal cutters and the like, S. E. Proctor (assigned to Austin Hoy & Co., Ltd., Aylesbury, England), Jan. 22, 1957.** In an improved ball- and socket-joint for tool carrying chains of the type used on coal cutters, the removable element of the socket is held in place by a form of bayonet joint having interlocking elements. No. 2,778,236.

**Gas pressure blasting device, E. C. Filstrup (assigned to Armstrong Coalbreak Co., Benton Harbor, Mich.), Jan. 22, 1957.** An improved gas pressure blasting device used for breaking coal faces provides a construction that enables easy removal of the fractured shear plate, regardless of whether or not distortion has caused it to interlock with an outer clamp member. No. 2,778,309.

**Conveyors, J. H. Foster, Jan. 22, 1957.** A design for a sectional conveyor which

# new Bowdil TRIMMER CHAIN

FOR ALL MAKES CONTINUOUS BORING MACHINES

USES BOWDIL THROW-AWAY OR ½" x 1" SHANK BITS

NOTE THIS

**COUPLING PIN DESIGN**

CHAINS MAY READILY BE ASSEMBLED OR DISASSEMBLED WITH THE USE OF SMALL HAND TOOLS

CHAIN PITCH MAY BE VARIED BY CHANGING COUPLERS ONLY

Great strength and flexibility. Highest grade steel "Fabri-Forged" to Bowdil standards of precision & performance.

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# ENSIGN MINE DISTRIBUTION BOXES

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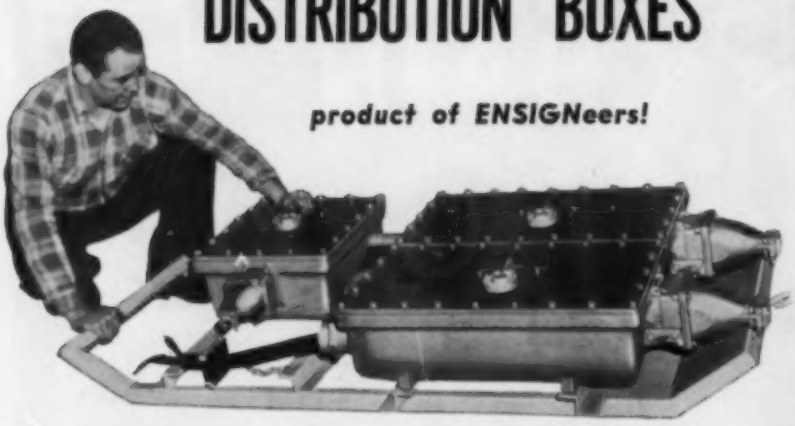

## *Designed for SAFETY*

ENSIGN Type KK-G Permissible Distribution Boxes, as illustrated, are recommended for use with mining machine, loading machine and drill.

For many years ENSIGNeers have worked diligently with the mining industry to improve ENSIGN electrical products to the end that these distribution boxes are as safe and trouble-free as can be manufactured.

ENSIGN Distribution Boxes incorporate many exclusive features . . . among them . . .

1. ENSIGN Safety Plugs . . . with all parts renewable
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3. ENSIGN Mechanical Trip . . . that trips the circuit breaker when the plug is disengaged, independent of electrical power

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## Coal Patents *(Continued)*

can be attached directly to the rear end of an advancing coal mining machine and will always be in position to receive coal from the machine. No. 2,778,484.

**Coal cleaning, A. A. Hirst (assigned to The National Coal Board, London, England), Jan. 22, 1957.** An improved process for separating impurities from coal by washing in boxes in which water pulsates through a grid supporting a washing bed. This method is directed towards simple and inexpensive means for separating the finer sizes. No. 2,778,496.

**Method of froth flotation, E. A. C. Chamberlain, P. L. Waters, and W. S. Robertson (assigned to Coal Industry Patents Ltd., London, England), Jan. 22, 1957.** In a method for increasing the extraction efficiency of a coal froth flotation process, a conditioner, a frother and air are introduced into the aqueous suspension, which then is subjected to mixing and agitation. However, the mixing and agitation step is by-passed by a minor part of the flow suspension, that portion being united with the main flow just prior to removal of the coal-laden froth. No. 2,778,499.

**Mining method providing for continuous progression of mining machinery, C. A. Reis, Jan. 22, 1957.** An improved method of mining coal seams with greater speed and at lower cost than by usual methods. Long rooms are formed by making narrow drives, and the coal is broken by longwall slabbing. Maximum use of heavy machines is realized, and a large percentage of lump coal is produced. No. 2,778,622.

**Comminuted coal fines and method of comminuting agglomerated coal fines, W. Hartmann, Jan. 22, 1957.** Anthracite coal silt is treated with a small percentage of spent sulfite liquor to decrease the adhesiveness of the agglomerated coal fines. The minus 200-mesh particles thus produced can be conveniently handled in ordinary coal fines handling apparatus. No. 2,778,718.

**Roof supporting means or cap and a method of positioning the same, O. Jacobi and O. Miller (assigned to Gutehoffnungshütte Oberhausen Aktiengesellschaft, Oberhausen, Germany), Feb. 5, 1957.** An improved method of successively positioning roof supports ahead of the mining machine in coal mines. Elements are locked to previously placed caps as mining progresses. No. 2,780,067.

**Method of mining coal, J. F. Core and A. R. Werft (assigned to United States Steel Corp., a corporation of N. J.), Feb. 5, 1957.** A method for rapidly advancing a coal face by making most efficient use of a continuous mining machine. Narrow, adjoining drives are made in the seam, and roof supports are installed immediately in the portion adjacent to the next working face. Roof falls are mini-

# Gets 160 extra tons daily on 16% grade

## from model "65" PAYHAULER®!

160 extra tons of shale refuse daily! That's how much more bonus production Corte Construction Company, Kimball, W. Va., is getting from their International "65" Payhauler than their other haul unit.

Corte is making this startling production comparison at their mountain-top strip mining operations for the Peerless Coal & Coke Company, Division of Pocahontas Fuel Co., Pocahontas, Virginia. Corte has the contract to haul the refuse from cleaners at the bottom of the mountain to a fill located high up on the mountain side a mile away. The entire trip is up a 16% grade. Yet, the Payhauler carrying four more tons each trip maintains the same speed as the other unit.

To Corte, over a five-year period, this means a saving of approximately $18,000! The figure represents the extra labor, fuel, tire, insurance, and tax costs incurred by the competitive unit in carrying the additional 12,000 loads required to equal the five-year production of the "65"!

Prove to yourself how much an International Payhauler will boost your overburden or refuse hauling production. Try its safe and easy full-load maneuverability. Test the ample power of its 250 hp turbocharged diesel engine...save up to 10% on fuel consumption, as well. Ask your International Construction Equipment Distributor for a demonstration, soon!

Double-acting hoist cylinder in all stages with *106,300 pounds of force in first stage* permits dumping Corte's 20-ton loads in less than 10 seconds. Hydraulic snubbing action prevents undue stress on hoist cylinders and "gentles" body return to frame.

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International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors ... Self-Propelled Scrapers and Bottom-Dumps ... Crawler and Rubber-Tired Loaders ... Off-Highway Trucks ... Diesel and Carbureted Engines ... Motor Trucks

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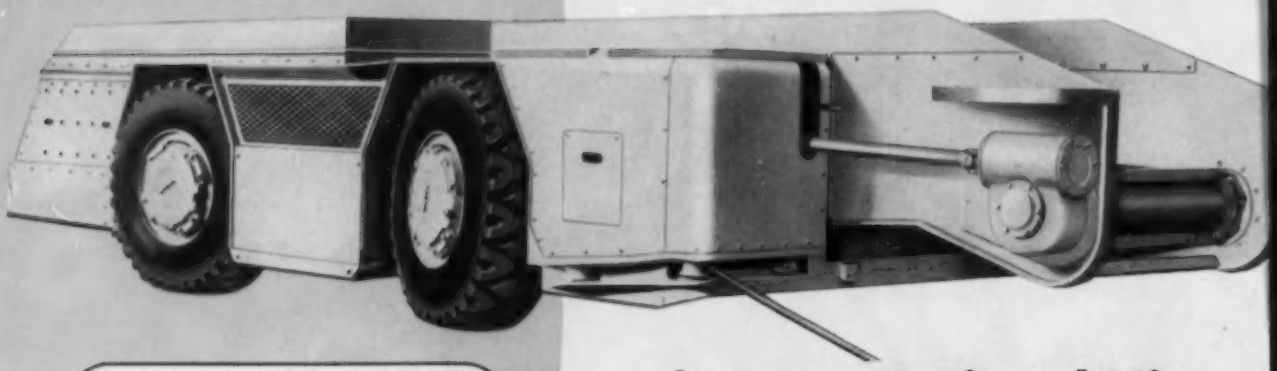

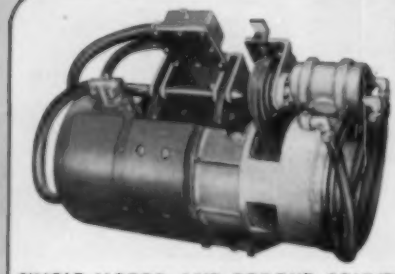

1

SINGLE MOTOR AND TORQUE CONVERTER

2

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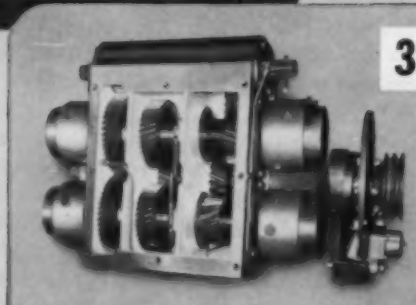

3

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## the new National Mine TORKAR*

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**1** A single, large, non-reversing A.C. or D.C. motor amply provides all the power requirements of the new National Mine Torkar and effects substantial savings in motor maintenance. Electrical controls and wiring are at a minimum, further reducing maintenance costs. The motor drives through a torque converter which allows the motor to operate in its most efficient range, prolonging motor life, eliminating the possibility of thermal damage to the motor and conserving current.

**2** New type wheel units of heavy automotive design are a feature of the Torkar, and all four are identical and interchangeable. They employ a spiral tooth spur gear-and-pinion drive running in oil. The units are not adversely affected by housing misalignments, and are extremely rugged and durable.

**3** Three speeds forward and reverse are provided by the constant-mesh transmission, which permits selection of the gear ratio best suited for the roadbed or grade, eliminates "jogging," and provides dynamic braking. The transmission makes possible the use of a highly efficient non-reversing motor, protects the motor against overloading, reduces wear on the service brake and further reduces power consumption.

For complete details on how the Torkar can reduce your shuttle car costs, consult your National Mine representative or write.

National Mine Service Company

## National Mine Service Company

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All-State Division, Logan, W. Va.
Anthracite Division, Forty Fort, Pa.
Ashland Division, Ashland, Ky.
Bemeco Division, Beckley, W. Va.
Kentucky-Virginia Division, Jenkins, Ky.
Western Kentucky Division, Madisonville, Ky.
Whiteman Division, Indiana, Pa. Morgantown, W. Va.

*Trademark

U.S. Bureau of Mines

## Coal Patents *(Continued)*

mized by the narrowness of the rooms and by the nearby supported ground. No. 2,780,448.

**Process and apparatus for bore hole mining and conveying, P. L. Alspaugh and R. R. Cosner (assigned to Union Carbide & Carbon Corp., a corporation of N. Y.), Feb. 5, 1957.** A process and conveyor system for use in borehole mining of coal. A more nearly continuous and efficient operation is realized by elimination of the conveyor section manipulation usually necessary when the machine backs out of a hole. No. 2,780,451.

**Material disintegrating and removing apparatus, J. D. Russell (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Feb. 12, 1957.** Design for an improved disintegrating and coal removing apparatus for use with a continuous coal mining machine. No. 2,781,187.

**Cable reel for a mine vehicle or the like, R. M. Buckeridge (assigned to Goodman Mfg. Co., Chicago, Ill.), Feb. 12, 1957.** An automatic device for a shuttle car to prevent the unintended paying off of all the cable from the cable reel. This is accomplished by providing for a break in the power supply at the desired point of unreeling. No. 2,781,456.

**Flexible conveyor having successively shiftable sections for long face mining, W. Löbbe (assigned to Geverkschaft Eisenhutte Westfalia, Lunen, Germany), Feb. 19, 1957.** An improved laterally flexible, sectionalized, endless type conveyor especially useful in mining coal by longwall methods. No. 2,781,888.

**Method of dewatering and dressing very fine-grained mineral substances, W. Reerink, W. Muschenborn, and E. Notzold, Feb. 19, 1957.** A method of dewatering and dressing mineral fines, particularly coal fines such as flotation concentrates. After the material is rendered hydrophobic it is dewatered by centrifugal screening. No. 2,781,904.

**Process and apparatus for the separation of mixtures of solid particles, F. J. Fontein (assigned to Stamicarbon, N. V., Heerlen, Netherlands), Feb. 19, 1957.** A heavy media separation process and apparatus for reconditioning de-slimed coal fines makes use of suspensions of magnetic particles. No. 2,781,906.

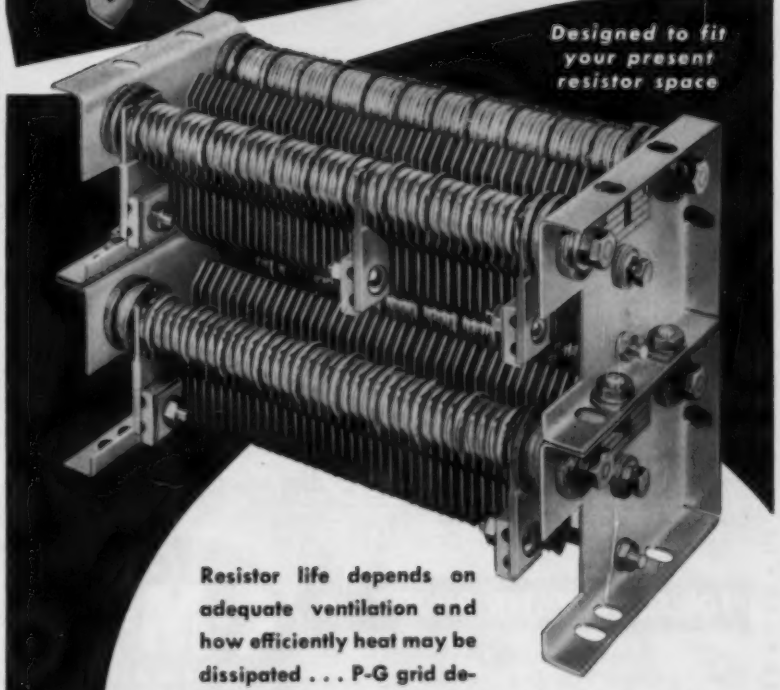
## Books for Coal Men

### Selecting and Applying Pumps

**Pump Selection and Application,** by Tyler G. Hicks. A comprehensive guide to help engineers select and apply the best pump for a given set of conditions. The work includes descriptions of the basic types of pumps and problems met in their application. Individual chapters are devoted to the specific problems of major industries. 400 illustrations. 422 pp. 6x9¼-in; cloth. $8.50, McGraw-Hill Book


Resistor life depends on adequate ventilation...

Patented P-G Grid Design assures maximum ventilation



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Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

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# How deep is the overburden?

Why guess when these low-cost, easy to operate Acker LD Core Drills tell you

**Quickly!**

**Easily!**

**Inexpensively!**

1. Quality of Coal
2. Thickness of Seam
3. Depth of Overburden

Model LD powered with a 12HP motor for depths to 300'.

Model LD powered with a 7HP motor for depths up to 150'.

For simplicity of design and operation you just can't beat the Acker LD. We've kept moving parts to a minimum and eliminated all feed gears or screws. (Elimination of unnecessary parts cuts down weight, too—an advantage when operating in isolated locations.)

Our newly designed double tube core barrel retrieves samples even where others fail!

Your choice of power and mounting.

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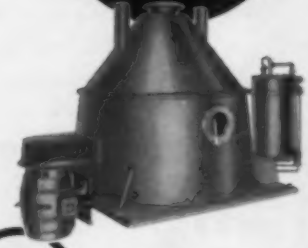

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## New Books *(Continued)*

Co., Inc., 330 W. 42nd St., New York 46, N. Y.

### International Coal Classification

**International Classification of Hard Coal by Type,** prepared by the secretariat of the Economic Commission for Europe, describes the international classification system of hard coals by type and the statistical grouping of hard coals. The system meets the needs of producers, traders and users of coal for a common standard. 21 charts, 3 tables. 56 pp. 8½x11-in; paper. Available in English-French edition. $.50, Sales Section, European Office of the United Nations, Geneva, Switzerland, or International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y.

### Ohio Coal Resources

**Coal Resources of the Upper Part of the Allegheny Formation in Ohio,** by Russell A. Brant. This report presents in concise form conclusions and results of the appraisal of the original coal reserves of the Middle Kitanning, Lower Freeport and Upper Freeport coal beds. 68 pp., including illustrations. R. I. 29. 8½x11-in; paper. $.50, Division of Geological Survey, Room 106, Orton Hall, Ohio State University, Columbus 10, Ohio.

### Human Relations

**Improving Human Relations** offers management a program designed to develop better supervisor-employee relations and thus improve productivity. 32 pp. 6x8½-in; paper. $.50, NAM Employee Relations Dept., 2 East 48th St., New York 17, N. Y.

### European Coal Supplies and Needs

**Review of Coal Supplies and Requirements in Western European and Soviet Bloc Countries, 1955 and 1956,** by G. D. Drechsler, C. R. Gentile, George Markon and J. J. Liammari. This report outlines the present and future fuels and energy postition in Europe and will provide useful information to those interested in foreign coal trade. USBM I. C. 7778. 44 pp. 8x10½-in; paper; mimeo. Free, Publication-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

*The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.*

**Anthracite Mechanical-mining Investigations: Use of Yielding Steel Supports (Props) in Combination with Backfilling for Mining Tick, Flat Beds,** by J. C. Hartley, J. D. Cooner, Sr. and R. J. Brennan. R. I. 5290.

**Production of Crude Ammonia-Synthesis Gas from North Dakota Lignite in an Annular-Retort Gasifier,** by W. H. Oppelt, T. W. Kamps, C. H. Gronhovd, W. R. Kube and R. McMurtrie. R. I. 5297.

**36-INCH NEOPRENE BELT** on a rope conveyor carries coal to an automatic car-loading installation. Notice there is no stopping in the cross duct behind the miner.

# How a West Virginia Mine Saves $8000 with a NEOPRENE Belt

Officials of a major mine in northern West Virginia estimate that each belt of Du Pont neoprene will result in an $8000 saving during its life because of its fire resistance. Here's why:

In West Virginia, non-fire-resistant belts must be separated from the main air supply with stoppings. Since a fire-resistant neoprene belt does not have to be isolated, construction of 26 stoppings is eliminated for each 2000-foot installation. Headings in the new mine, now on development work, advance rapidly. A 2000-foot heading is completed in about 13 weeks, and belt conveyors are moved as rail loops are brought in. So each neoprene belt saves building of over 400 stoppings during its expected 5 year life.

And there are other economies to belting of neoprene—a Du Pont synthetic rubber. This rugged belting resists tearing and chipping as well as deterioration by acid water, mold and mildew. In addition, it will not crack from exposure to sunlight or weather when used on the surface.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its outstanding resistance to abrasion, fire, aging, oil and grease will save you money. To be fully informed on the latest applications of neoprene, simply fill in the coupon below to receive free your regular copies of the Elastomers Notebook.

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DART 50 ton bottom dump coal hauler operating in a midwestern pit. One of a fleet of 6 DARTS, proving their economical operation daily.

# DART TRUCKS HAUL MORE for LESS!

**Precise, long time records kept by a number of U. S. coal mines prove DART'S superior performance and low maintenance costs.**

**Since 1903 DART has built standard and custom designed trucks to meet every haulage requirement.**

This DART 35 ton tandem rear axle coal hauler is operating high in the West Virginia mountains. Torque Converter with automatic downhill brake retards truck on favorable grades up to 20%.

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DART TONNAGE ENGINEERED TRUCKS

KANSAS CITY 8, MISSOURI

*A Subsidiary of the Carlisle Corporation*

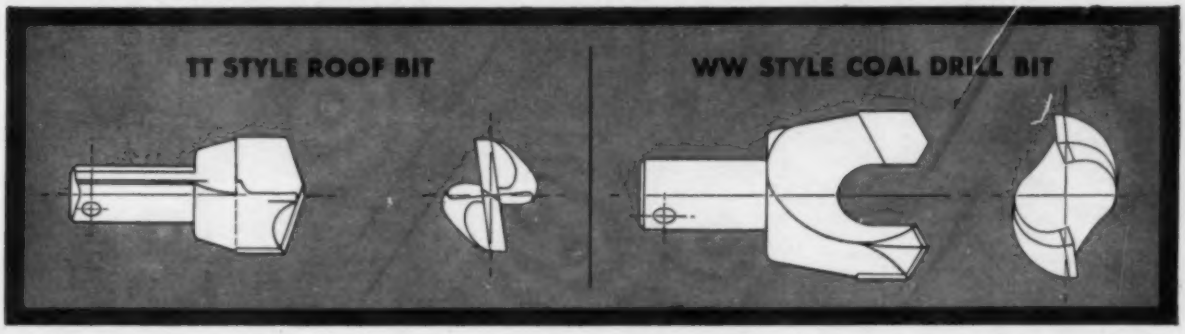
# 2 NEW MINING TOOL BITS

## with the Strength and Wear Resistance to tackle the most rugged jobs

Latest additions to the proven line of Carmet bits are the WW Style coal drill bit and the TT Style roof drill bit.

Both types have been newly designed for faster penetration and greatly increased tool bit life.

Heavier alloy steel backing on the shanks provides support for a harder, more wear resistant grade of carbide tip. Longer wear length along the cutting edge permits full use of all the carbide before discarding the tool.

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McCombs Supply Co., Jellico, Tennessee
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U. S. Steel Supply Co., Pittsburgh, Pa.
W. B. Thompson Co., Iron Mountain, Michigan

Extensive tests have proved the ability of the TT Style roof drill bit to penetrate the most rugged formations without premature massive tip fracture or excessive wear. Full feed pressures can be used on the heaviest duty roof bolters for greater production and economy of operation.

The new design of the WW Style coal drill bit allows faster penetration and easier cutting either in hand-held or power-fed drills. This bit is designed with a wide scoop for quick, easy removal of loose cuttings. Proper gage is maintained through the life of the tool, which field tests show to be double that of any competitive bit.

*Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Mich.*

*The Original DOUBLE-BONDED Carbide Bit*

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The RIGHT Answer to Your BULK STORAGE Needs:

MARIETTA CONCRETE SILOS

Coal storing and handling becomes simplified, efficient and economical when you have a MARIETTA storage system engineered to your operation.

Marietta silos are economically erected in any desired capacity . . . any number of units. Interlocking concrete stave construction provides safe, dry storage . . . resists wind, shock or fire . . . requires a minimum of maintenance.

Conveyors, feeders, discharge systems or other auxiliary equipment for your particular material handling requirements can be mounted on the sturdy walls of a Marietta silo.

Depend on Marietta's 41 years of experience to design and erect the most efficient storage system for your need under one cost-saving contract. No delays due to critical material shortages with a Marietta installation . . . erection is quickly and efficiently handled by factory trained personnel.

*Write for Marietta's Modern Industrial Storage Systems Booklet and the right answer to your bulk storage problems.*

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41 Years Know-How in Pre-Cast Concrete Construction

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# Among the Manufacturers

This was the news:

**Barber-Greene Co., Aurora, Ill., disclosed plans to construct a new plant near DeKalb in northern Illinois and expand its Canadian subsidiary near Toronto, Ont.**

The Illinois plant will be a manufacturing facility (photo) and is expected to be operating fully this fall. In it Barber-Greene will produce "some segment of the company's line of bituminous mixing and paving equipment, ditchers, loaders, conveyors, car unloaders and other materials handling equipment." The plant will rise on a site that will contain a two story office, a cafeteria and extra space. The main factory and general offices will occupy 150,000 sq ft. Barber-Greene has not disclosed the cost. In Canada Barber-Greene Canada, Ltd., is being expanded by adding 43,000 sq ft of shop space and a new two-story office building.

**NEW PLANT** being built by Barber-Greene Co., near DeKalb, Ill., will contain 50,000 sq ft of manufacturing and office space. Company has not disclosed cost of expansion.

**Simplex Wire & Cable Co., Cambridge, Mass., installed a Philips impulse generator of advanced design as part of the company's expanding research and development program.**

The generator, manufactured in the Netherlands and sold to Simplex by the Instruments Div., North American Philips Co., Inc., Mt. Vernon, N. Y., is reportedly the first of its kind in the United States. Rated at 1.4 million volts with an energy of 16 kw-sec, the impulse generator was installed at the Simplex High Voltage Laboratory in Cambridge where studies will be made covering variations in mechanical construction of cable as well as insulation factors in materials of varying thickness. The investigators will pay special attention to breakdown properties with regard to time, and all research will be correlated with lightning, switching and power surge problems. Small dimensions, low self-inductance, low stray capacitance and high stored energy are features of the unit.

**FOR EXPANDING RESEARCH** Simplex Wire bought impulse generator.

**Femco, Inc., Irwin, Pa., appointed five district sales managers.**

The appointments: James Beaven, manager of sales in the southern United States industrial area; John W. Bauer, Jr., western Pennsylvania; John Taylor, Cleveland, Youngstown, and Buffalo; Addison Davidson, Jr., eastern United States; and Warren C. Sprague, the west coast. Femco manufactures electronic and control systems.

**Speck-Cornett Distributor, Inc., Lothair, Ky., was appointed a Carboloy carbide mining tool distributor by General Electric's Metallurgical Products Dept., Detroit, Mich.**

Speck-Cornett will handle standard cemented carbide roof drills, coal augers, universal mining machine cutter and finger bits, and special carbide tools.

**Don L. Douglass, Thew shovel parts sales manager since 1955, was appointed manager of the company's Parts Div., Elyria, Ohio.**

He replaces A. W. Wagner. Mr. Douglass joined Thew after leaving the

## KEEP COSTS DOWN *with help like this . . .*

- TORQUE CONVERTER DRIVE . . . matches power and speed to the job requirements automatically
- 1,000-HOUR LUBRICATION INTERVALS . . . for truck wheels . . . eliminates daily greasing
- ONE-PIECE STEERING CLUTCH AND FINAL DRIVE HOUSING . . . insure perfect alignment, long life
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- ALL-STEEL BOX-A MAIN FRAME . . . provides full-strength protection

All pioneered and proved by Allis-Chalmers . . . five of dozens of basic advantages that help hold costs down . . . handle more jobs . . . contribute to a profitable operation. Now is the time to have them working for you. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

**ALLIS-CHALMERS** *Engineering in Action*

# LUBRIPLATE No. 630-AA LUBRICATES ABOUT EVERYTHING

**LUBRIPLATE No. 630-AA** is practically a universal grease type lubricant. It was developed to meet industries' need for *"simplified lubrication"* . . . one lubricant to effectively satisfy a great number of requirements. LUBRIPLATE No. 630-AA has a smooth, stable consistency, a wide temperature range, possesses high film strength, fine adhesive properties and is water repellent. It satisfies most lubrication requirements, thus eliminates the need for a different lubricant for each application in many cases.

**REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE**

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

## Manufacturers (*Continued*)

American Steel Dredge Co., Fort Wayne, Ind., where he had been vice president in charge of distribution and service for Wayne cranes.

**Boston Woven Hose & Rubber Co., began occupying warehouse facilities in Denver.**

The company's complete line (hose, belting, packing, matting, etc.) will be stocked. J. H. Steffensen, district manager, is supervising.

**Sterling Engine Co. appointed E. J. van Dyk sales manager.**

The Detroit, Menominee, Mich., company made the appointment as part of current plans to expand the sales program of Sterling engines. Mr. van Dyk, before joining Sterling, was with the Detroit Diesel Engine Div., General Motors. Sterling makes portable 450- to 1,000-hp, six-cylinder and eight-cylinder diesels. In addition it specializes in manufacturing 1,200-rpm, direct-drive portable generator sets, 250 kw to 600 kw.

**Samuel M. Parks was promoted to manager of Pittsburgh district sales for the American Steel & Wire Div., United States Steel Corp.**

Prior to the new appointment Mr. Parks had been assistant manager of sales. He joined AS&W as a priorities correspondent in 1942. In 1945 he was promoted to salesman.

**Goodyear Tire & Rubber Co.'s Industrial Products Div. announced four major promotions.**

Appointed: O. A. Schilling, sales manager; H. R. Comstock, assistant sales manager; R. E. Chapman, manager, central region; and R. E. Mercer, manager of hose sales.

**Union Wire Rope Corp., Kansas City, Mo., appointed Tom Settles its representative in Virginia and North Carolina.**

Mr. Settles is a graduate of Rockhurst College, Kansas City, and has completed Union Wire Rope's in-plant training course. His headquarters will be in Raleigh, N. C.

**George R. Powers, Jr., was appointed St. Louis regional manager of Gould-National Batteries Industrial Div.**

He leaves a New York post as specifications engineer and export manager to serve in the eight-state area of Nebraska, Kansas, Oklahoma, Missouri, Arkansas, southern Illinois, southern Indiana and western Kentucky. Mr. Powers' new duties include expediting, selecting and servicing industrial batteries.

**Douglas W. Vernon was named product sales manager for wire rope and aircord by John A. Roebling's Sons, Corp.**

Mr. Vernon leaves the post of vice president and general manager of the Leschen Wire Rope Div., Watson Stillman Co. His new office is situated in Trenton, N.J. Before joining Leschen Wire Rope, Mr. Vernon had been employed by Roebling for more than 23 yr.

INCREASE THE LIFE OF YOUR PREPARATION SCREENS 500%

# Kleenslot WEDGE WIRE PREPARATION SCREENS

Replace wire cloth in the elimination of blinding. Primary screening of raw 5 x 0 and 6 x 0 coal to remove the ¼ x 0 for dry cleaning is no longer a problem at the four West Virginia plants of the Red Jacket Coal Corporation. Kleenslot Wedge Wire Screens have brought about this efficient change over. Since 1951 they have brought about continuous money saving in material and labor for replacements and have relieved plant operators of the need for frequent inspections to detect blinding and holes in the screen cloth.

CUT REPLACEMENT COSTS • MINIMUM SHUTDOWN TIME

It costs nothing to obtain a Wedge Wire recommendation. We will gladly furnish this service without obligation. Remember, Kleenslot Wedge Wire Screens are best by every test, so why not specify the best.

*Send for free completely illustrated catalog today.*

Wedge-Wire CORPORATION
Gas Street at Nickle Plate R. R.
Wellington, Ohio

"I've driven Bethlehem Spikes by the hundreds.
With such strong heads and sharp points,
no wonder they drive so true!"

*Track bolts and machine bolts, too!*

BETHLEHEM STEEL

# For heavy hauling you'll do better with **JEFFREY** 8-wheel Trolley Locomotives

Big coal loads can be hauled fast with Jeffrey 27, 37 or 50-ton single-unit locomotives.

Operation and maintenance are better, too. The four-wheel, equalized double trucks and the short overhang at the ends give an easy ride at high speed. The eight wheels distribute the locomotive's weight for less concentrated rail loading.

Outstanding operating and safety features include: roller-bearing type journal boxes and motor axle suspensions... air and dynamic service brakes... automatic couplers with air-operated uncoupling . . . trolley with air-operated retriever...separate blower for each motor.

Other features of 8-wheel locomotives and other types for mainline and secondary haulage are described in Catalog 836. For a copy, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

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MINING • CONVEYING • PROCESSING EQUIPMENT
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## CONTRACT CORE DRILLING

**EXPLORATION FOR MINERAL DEPOSITS**
INCLUDING URANIUM & LIMESTONE — ANYWHERE

**FOUNDATION TEST BORING • GROUT HOLE DRILLING**

**Skilled crews and complete stock of core drills and accessory equipment maintained at all times**

***Core Drill Contractors for more than 60 years***

**JOY MANUFACTURING CO.**
*Contract Core Drill Division*
MICHIGAN CITY, INDIANA


## Manufacturers *(Continued)*

**Louis Greenfield was appointed assistant general sales manager of Pendleton Tool Industries, Inc., and its affiliates.**

Mr. Greenfield will assist Marvin S. Bandoli in administering merchandising, marketing and sales activities. Since joining Pendleton in 1943 Mr. Greenfield has served in a number of special assignments.

**Joseph T. Ryerson & Son, Inc., Inland Steel subsidiary, leased 67,200 sq ft in St. Louis as part of current expansion plans.**

Ryerson will erect a warehouse on the lot which already holds a one-story building. The property is close by the present Ryerson plant and will be used for facilities of the company's sheet and strip division.

**Link-Belt Co. moved its Louisville district office to larger quarters.**

The expansion of operations in the area caused the move, according to Link-Belt. The Louisville office operates in central Kentucky from the Ohio River to Tennessee and in four southern Indiana counties near Louisville.

**Continental Gin Co., Birmingham, Ala., kicked off a multi-million dollar expansion program.**

The program, which will require several years to complete, will mean improvements at all the company's facilities in Birmingham, Dallas, Prattville, Atlanta and Memphis. Scheduled for immediate construction is a three-story wing addition to the company's general office building in Birmingham. In addition, equipment to expand production will be installed. In Continental's other plants office space and production facilities will be enlarged.

**Fairmont Machinery Co., Fairmont, W. Va., gained exclusive rights to manufacture and sell the Chance cone in the United States.**

Fairmont says it will maintain engineers to service new plants under construction as well as the number of Chance plants now in operation.

**Robert T. Dunlap was elected vice president of the American Wire Fabrics Corp., a subsidiary of the Colorado Fuel & Iron Corp.**

American Wire Fabrics produces wire screen at its plant in Mount Wolf, Pa. Mr. Dunlap has been associated with the Wickwire Spencer Steel Co., the Great American Industries, Inc., and the Vulcan Iron Works. From 1922 to 1932 he was general superintendent of foundries for the Jones & Laughlin Steel Corp.

**Seven major personnel changes were disclosed by Hercules Powder Co.'s Explosives Dept.**

E. K. Lefren, former manager of the company's Port Ewen, N.Y., works, was appointed assistant director of operations of the Explosives Dept., Wilmington.

# How Bucyrus-Erie Bonus Quality Helps You Cut Costs, Increase Output

This is the Bucyrus-Erie 38-B shovel that won praise from its owner in this stripping operation near Oliver Springs, Tenn.

To discover the real advantages of Bucyrus-Erie *Bonus Quality* put a Bucyrus-Erie shovel to work in your pit. That's what Chas. Walls and Sons, Oliver Springs, Tennessee did.

Walls' job was to strip four feet of sandstone and 25 feet of shale and dirt to get at the coal in a mine near Oliver Springs, Tenn. The complete job involves excavation of 1,200,000 yards of overburden. After putting a Bucyrus-Erie 1½-yd. 38-B to work for a year, Walls commented, "Excellent service, strongest built of any shovel of its rated capacity."

"Strongest built" is just a part of the advantages of *Bonus Quality*. Not only do you get design and construction that adds years of life and keeps maintenance costs low, but there's extra performance value, too. There is high-speed operation that delivers big output. There is dependability that *keeps* big output coming day after day.

When you plan to add a shovel to your operations, be sure to get the story of *Bonus Quality* from your Bucyrus-Erie Distributor. Remember to see him soon. 243E56

**Bonus Quality** Bucyrus-Erie uses highest quality steel, then flame hardens it to bring you gears and pinions that wear long, keep costs low.

BUCYRUS ERIE

South Milwaukee, Wisconsin

**The world of science behind**
**EXIDE-IRONCLAD BATTERIES**

*Being interviewed is W. W. Smith, Divisional Manager, Product Engineering. Grids in back are of Exide's exclusive Silvium. Those in front are ordinary alloys.*

## "All of these alloys had the same acid test"

*At the Exide Laboratories*—**Reporter:** Was it a typical charge-discharge test normally used to test battery components?

**Smith:** Right. And the two positive plate grids with no visible signs of corrosion are Exide's patented Silvium alloy.

**Reporter:** How about the others—what alloys are they?

**Smith:** They're standard alloys used in other well-known makes of batteries. But they don't have Silvium's corrosion-resisting ingredients.

**Reporter:** Where is Silvium used?

**Smith:** In the positive plates of all Exide-Ironclad and many other Exide Batteries.

**Reporter:** How does it affect battery performance?

**Smith:** Every test we've made proves it stretches battery life because the grid resists corrosion—sometimes up to 100% longer.

**Reporter:** Obviously this is an important feature of the Exide-Ironclad.

**Smith:** Yes it is, but it's just one of many engineering details that contribute to its high capacity and long life.

**Note to battery users:** Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY **Exide**®

**NOW! A PORTABLE BUCKET PUMP WITH ADJUSTABLE LEVERAGE SAVES TIME AND MONEY IN LUBRICATION OF HEAVY EQUIPMENT!**

# *NEW* ALEMITE "BIG-A" PORTABLE BUCKET PUMP

**Lubricates hundreds of bearings with fewer refillings!**

The all-new design and construction features of the new Alemite "Big-A" Bucket Pump bring you these important advantages:

- **Handles either oil or grease!**
- **Adjustable 3 ways, for—**
  1. Light or heavy lubricants.
  2. Cold weather.
  3. Pressures from 2,500 to 5,000 lbs.
- **Easiest to carry!** Oval shape prevents bucket from bumping leg.
- **Easiest to fill!** Rugged cover is gasket-sealed . . . opens in a jiffy for fast filling.
- **Easiest to service!** One wrench disassembles entire unit.

**SPECIAL ALEMITE "BIG-A" FEATURES!**

- **Easily handles all lubricants.** Ends air pocket trouble and channeling.
- **New foot valve design assures full pressure** on every stroke.
- **Operates at top efficiency,** using any lubricant . . . in any weather.
- **Lube stays refinery clean.** No dirt or moisture entrance, no spilling grease.
- **Permanent pressure seal never needs attention.** Provides permanent protection.

- Exclusive Adjusto Lever!
- 35-lb. Capacity!
- Hard Chrome Piston!
- Non-tilt Foot Rest!
- 7 Models—for all types of lube fittings!

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**For complete information, write Alemite, Dept. RR-37, 1850 Diversey Parkway, Chicago 14, Ill.**

## Manufacturers (*Continued*)

E. St. Pierre Bellinger, former manager of the California works was appointed manager of Ketona Chemical Corp., Birmingham, Ala. Dana F. Sprague, former plant manager of Ketona, was appointed manager in California. Henry V. Chase, Jr., was appointed manager of the Pluto Works, Ishpeming, Mich. Gordon M. Hoffman, was appointed assistant manager at the company's Missouri Ammonia Works.

**Acme Rubber Mfg. Co. appointed J. V. Carlin, Jr., to succeed his father, J. V. Carlin, Sr., as the company's general sales manager.**

The younger Mr. Carlin will supervise sales of Acme's industrial rubber, automotive and plastic products. The elder Mr. Carlin is being retained as a consultant.

**Pangborn Corp., Hagerstown, Md., promoted sales manager Arthur J. Buckley to general sales manager.**

Mr. Buckley joined the company in 1952 as assistant sales manager. He was formerly associated with the Harnischfeger Corp., Milwaukee, Wis.

**Ralph G. Greer was made manager of sales, Construction Equipment Div., International Harvester Co.**

Mr. Greer succeeds the late I. P. Payne. In another appointment Leslie J. Lange was made assistant sales manager.


*NEW SPEED AND DRILLING ECONOMY*

**TWO DRILLS IN ONE**

**Parmanco**

**Model 51-55 Dual**

**COAL DRILL**

*"It's a life saver to us"* says W. V. Hartman, Supt. Victoria Coal Corp.

Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 106 hp engine. Push button controls. Drills can be operated singly or in tandem.

**CUTTINGS SHIELD and GUIDE—completely automatic**

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

• *SEND FOR COMPLETE DETAILS*

**PARIS MANUFACTURING CO. PARIS, ILLINOIS**



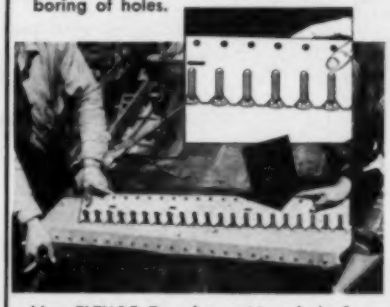
**NEW**

**FLEXCO POWER TOOLS**

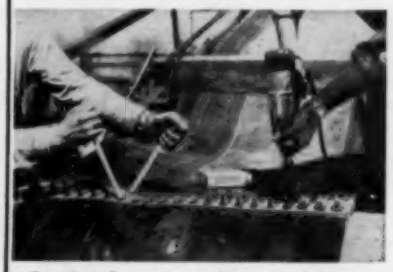
***CUT APPLICATION TIME IN HALF***

Your two man belt team can now join a belt 30" wide in 15 to 20 minutes . . . using the new FLEXCO Power Tools.

The FLEXCO Power Tool Boring Bit used with electric or air impact tool speeds boring of holes.



New FLEXCO Templet positions bolts for quick joining of belts. Reaching under belt has been eliminated.



Running down nuts is fast with the new FLEXCO Power Wrench used with electric or air impact tool. Two Bolt Breakers are used together to complete the joint.

If you are interested in speeding up fastener application, order the new Power Tools from your local FLEXCO Distributor. Write for Bulletin F-112-A.

**FLEXIBLE STEEL LACING CO.**

4638 Lexington Street • Chicago 44, Illinois

# Why the Yieldable Arch gives better roof support

When you drive a drift through heavy ground formations you usually need some kind of roof support, at least until the surrounding strata have had a chance to relax and form a natural pressure arch. Several types of material—timber, steel, concrete—are used as roof supports.

However, no rigid material can long support the dynamic forces caused by rock pressures and the weight and subsidence of the overburden. As a matter of fact, the more rigid the support the more aggravated the condition may become. This, in turn, is reflected in much higher maintenance costs.

This brings us to Bethlehem's Yieldable Arch, which "gives" rather than deforms under excessive pressures. This gradual yielding allows the ground to relax into a natural pressure arch, restoring equilibrium of the disturbed forces.

A Yieldable Arch set consists of curved U-shaped sections nested together at points of overlap. These overlapping joints are secured by heavy U-bolt clamps which are drawn up tight enough to hold fast under a predetermined load. When forces exceed this load, friction in the joint is overcome and the arch set yields before deformation of the steel takes place.

Besides increasing mine safety, the Yieldable Arch offers recoverability and usually pays for itself in its first year of service. Some installations have paid their way in less than six months! A Bethlehem engineer would like to discuss the advantages of the Yieldable Arch with you; you can reach him through the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation*

**BETHLEHEM STEEL**

BETHLEHEM STEEL

## THE LAST WORD IN SCREENING EFFICIENCY

The word's out on wedge wire and ***Hendrick has it!***

That's right. With the addition of new Hendrick Wedge Wire, Hendrick now makes available a complete line of screens for the best in efficient, low-cost screening, dewatering and filtering operations. It's ideal wherever it is important that screen openings be minutely fine, have excellent draining qualities and a high degree of accuracy and rigidity. For details on how Hendrick Wedge Wire can best be applied to your specific requirements and afford tops in low-cost, efficient screening, call your nearby Hendrick Sales Engineer. He's listed in your local classified telephone directory under ***Perforated Metals.***

**Hendrick**

MANUFACTURING COMPANY

41 DUNDAFF STREET, CARBONDALE, PA.

*Sales Offices in Principal Cities*

**Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro-Dehazer**

## A TRULY PORTABLE BOND WELDER

**Is easy to handle even in low coal. Thin design permits easy removal from cars. A sturdy, dependable unit that can be quickly and easily hauled to the job and put to work immediately.**

**Quick change taps provide proper welding current for all requirements.**

**Put an end to your welding problems with a GUYAN Portable Bond Welder.**

***Full descriptive bulletins available . . . Write for yours***

**GUYAN MACHINERY CO., Logan, W. Va.**


## EQUIPMENT APPROVALS

*Ten approvals of permissible equipment were issued by the U. S. Bureau of Mines during January.*

Joy Mfg. Co.—Type X855-28, 30-in bridge conveyor; one motor, 4 hp, 500 v, DC. Approval 2-1168A, Jan. 3. (Approval 2-1168 covering 250-v loaders of this type was issued to Joy Mfg. Co. Aug. 24.)

J. T. Fish & Co.—Rebuilt type G15 Goodman shaker conveyor; one motor, 15 hp, 230 v, DC. Approval 2-1201, Jan. 9.

Long Co.—Utility truck; one motor, 5 hp, 72 v, DC. Approval 2-1202, Jan. 9.

Lee-Norse Co.—Type RJ5 utility truck; two motors, one 10 hp, one 3 hp, 230 v, DC. Approval 2-1203, Jan. 18.

Goodman Mfg. Co.—Type 512 power unit for mining machine; one motor, 50 hp, 250 v, DC. Approval 2-1204, Jan. 22.

Jeffrey Mfg. Co.—Type 61AMH conveyor power unit; one motor, 50 hp, 250 v, DC. Approval 2-1205, Jan. 22.

Joy Mfg. Co.—Type 11BU-14E loading machine; two motors, one 75 hp and one 4 hp, 250 v, DC. Approval 2-1206, Jan. 24.

Lee-Norse—Type LCM-26-1K miner; two motors, each 40 hp, 250 v, DC. Approval 2-1207, Jan. 25.

Fairmont Machinery Co.—Type 55B shuttle car; one motor, 25 hp, 550 v, DC. Approval 2-1132A, Jan. 25. (Approval 2-1132 covering 250-v shuttle cars of this type was issued to Fairmont Feb. 28, 1956.)

Joy Mfg. Co.—Type 14BU9-2AE loading machine; five motors, one 4 hp, two 15 hp, and two 10 hp, 250 v, DC. Approval 2-1208, Jan. 28.

*In addition to issuing approvals for the equipment above the USBM issued two acceptance designations covering conveyor belts that had been judged to meet the requirements of fire-resistance.*

Gutta Percha & Rubber Ltd.—Acceptance designation 28-16 assigned to cover 6-ply, 32-oz cotton duck "Efficiency Non-Flam" conveyor belting. Issued Jan. 28.

Mercer Rubber Co.—Acceptance designation 28-17 assigned to covered 4-ply, 32-oz cotton duck "Merprene" conveyor belting. Issued Jan. 28.

# *Announcing!* NEW REASONS WHY CHEVY'S BEST IF YOUR JOB IS BIG!

***New higher G.V.W.'s, new cast-spoke wheels, new full-air brakes, new bigger tire sizes in Chevrolet Task-Force Trucks!***

*G.V.W.'s increased as much as 4000 lbs. for bigger loads, bigger profits!* Chevrolet's mighty Triple-Torque Tandem is more than ever the industry's load-hauling champ—with G.V.W. hiked from a high 32,000 lbs. to a whopping 36,000 lbs.! In Series 5000H and 6000H models, G.V.W.'s have been advanced 1500 lbs. (to 21,000 lbs.) and in Series 7000 and 8000 models G.V.W.'s are now up 1000 lbs. (to 22,000 lbs.)!

*New cast-spoke wheels** are available on Chevrolet Series 9000 and 10000 trucks. These payload boosters are strong yet light, widely interchangeable, easy to service.

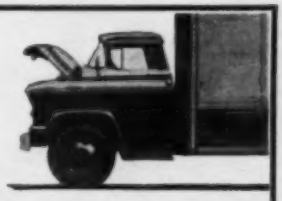
*New full-air brakes.** Safe straight-line stops with heavy loads are assured by these rugged brakes, now provided on Series 9000-10000 models.

*New bigger tire sizes.** New 11-22.5 tubeless tires, front and rear, or 10.00-20 tubed tires, are added assurance that 1957 Series 9000 and 10000 Chevrolet trucks are built from the ground up to haul your biggest load with ease!

For all the news about sky-high payloads and profits, see your Chevy dealer. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Optional, extra cost.*

**NEW CHEVY L.C.F. MODELS ARE SPECIALLY DESIGNED FOR MAXIMUM LOADS, EASY MANEUVERING AND SERVICING**



1. *Compact length* of the L.C.F. tractor (89¼ inches, bumper to back of cab) enables you to pull a long 35-foot trailer while holding overall truck length to less than 45 feet.
2. *Low height* of L.C.F. cab means that the distance from the ground to the cab floor is shorter; entering or leaving is more convenient.
3. *Short wheelbase* makes Chevy L.C.F.'s *maneuverable* trucks easy to wheel in and out of tight spots.
4. *Good weight distribution*—more *truck* weight on the front axle means that extra *load* weight can be placed on the rear axle.
5. *Easy servicing* is an added L.C.F advantage; all engine components are quickly accessible.

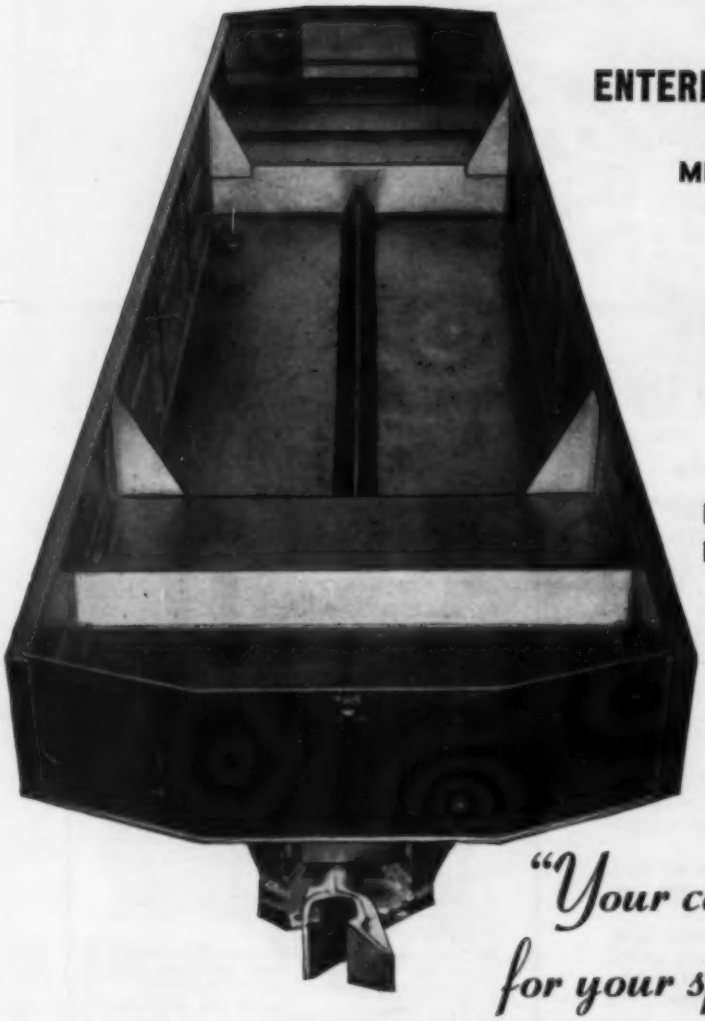
PROVED ON THE ALCAN HIGHWAY... CHAMPS OF EVERY WEIGHT CLASS!

## TASK·FORCE 57 CHEVROLET TRUCKS

CHEVROLET

# "CONTINUOUS" HAULAGE

# FOR "CONTINUOUS" MINING



## ENTERPRISE HAULAGE EQUIPMENT

**MINE CARS (4-Axle Cars, Thru-Axle Cars, 8-Wheel Cars)**

- End Dump Cars
- Side Dump Cars
- Bottom Dump Cars
- Rotary Dump Cars

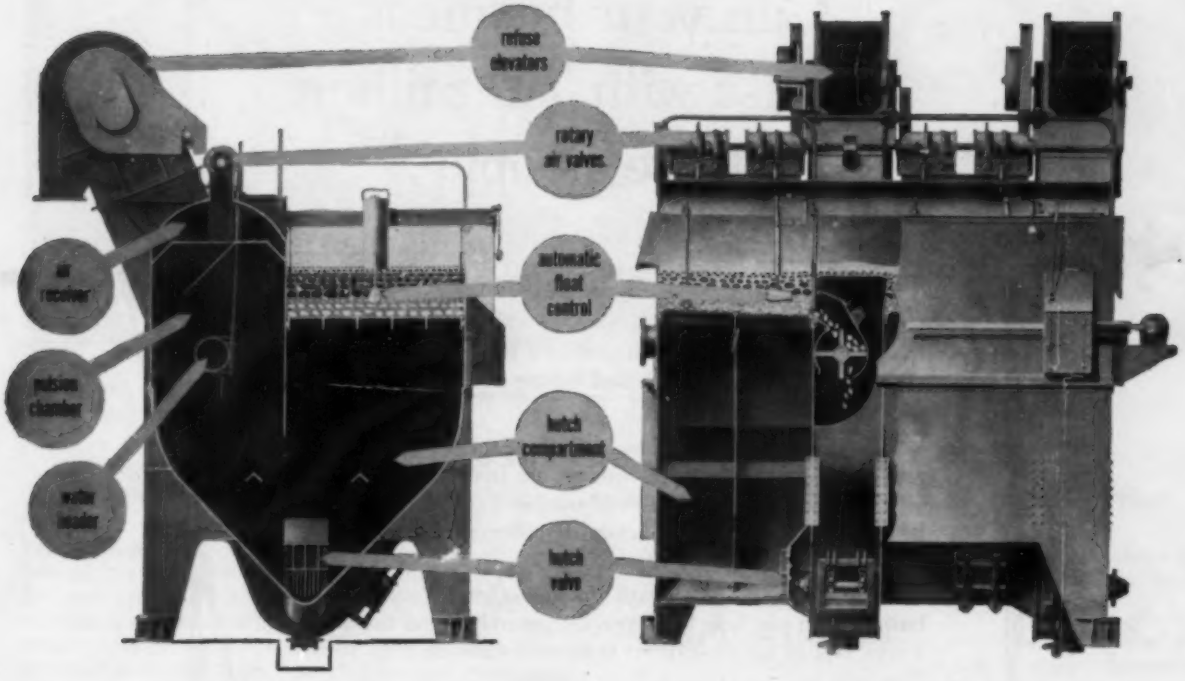
**EQUIPMENT HANDLING CARS**
**MAN-TRIP CARS**

*"Your cars custom-engineered for your specific needs"*

ENTERPRISE WHEEL & CAR CORPORATION

**BRISTOL, VA.-TENN. • HUNTINGTON, W. VA.**

# AIR-OPERATED JIG FOR WASHING COALS




Shown is a Jeffrey 84-inch, two-compartment, four-cell, air-operated Baum Jig. Also available are three-compartment, six-cell or eight-cell jigs and two-compartment, five-cell.

**AIR CYCLE:** At the beginning of each stroke a rotary valve admits compressed air to the pulsion chamber. A rapid build up of pressure causes a rapid upward acceleration of the water that lifts the bed of particles in a mass. As the valve continues to turn, it cuts off the incoming air. Then the air in the chamber expands. As the pressure drops, the upward acceleration of the water decreases and the bed of particles opens. Finally as the valve continues to turn, the air is exhausted and the actual separation takes place . . . all on the down stroke.

This down-stroke separation is a distinctive feature of the Jeffrey jig. It makes for effective separation over a great size range, such as 8" x 200 mesh. In fact, in contrast to competitive jigs, completely unsized feeds are preferred.

**JIG BED AT OPERATING GRAVITY:** The Jeffrey air cycle builds up to bed density in the jig to the operating gravity. There it is held constant by a float control. The result is a dense-medium separation over the whole size range.

**NO END-WALL DISTURBANCES:** Ordinarily, circulation along end walls causes the products withdrawn from a jig to be very much poorer than actually stratified in the jig bed. In Jeffrey jigs this defect, inherent in the jigging process, is overcome by a simple arrangement at the end of each compartment.

**LOW WATER:** The amount of circulating water required is a minimum, just enough to transport particles over the jig.

**HIGH UNIT CAPACITY:** The capacity of this jig is exceptionally high per unit of area, much above that of any competitive jig.

**CLOSED CIRCUIT CRUSHING:** This jig is ideal for a circuit involving preliminary washing combined with recrushing of middlings. The crushed middlings are simply returned to the same jig for rewashing. Such a circuit is very simple.

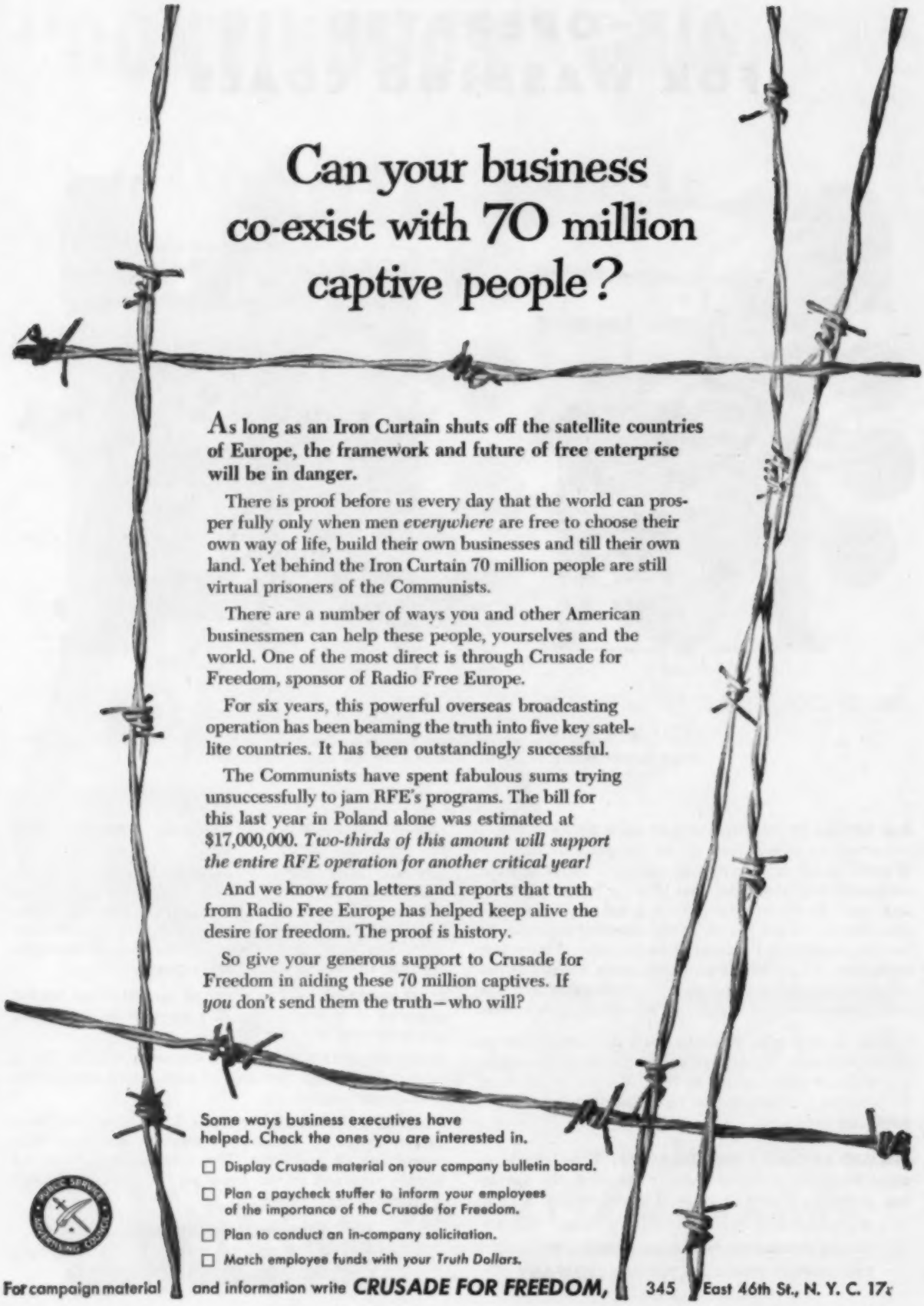
*For detailed information, get in touch with*

**THE JEFFREY MANUFACTURING COMPANY**

Columbus 16, Ohio

JEFFREY

# Can your business co-exist with 70 million captive people?



**As long as an Iron Curtain shuts off the satellite countries of Europe, the framework and future of free enterprise will be in danger.**

There is proof before us every day that the world can prosper fully only when men *everywhere* are free to choose their own way of life, build their own businesses and till their own land. Yet behind the Iron Curtain 70 million people are still virtual prisoners of the Communists.

There are a number of ways you and other American businessmen can help these people, yourselves and the world. One of the most direct is through Crusade for Freedom, sponsor of Radio Free Europe.

For six years, this powerful overseas broadcasting operation has been beaming the truth into five key satellite countries. It has been outstandingly successful.

The Communists have spent fabulous sums trying unsuccessfully to jam RFE's programs. The bill for this last year in Poland alone was estimated at $17,000,000. *Two-thirds of this amount will support the entire RFE operation for another critical year!*

And we know from letters and reports that truth from Radio Free Europe has helped keep alive the desire for freedom. The proof is history.

So give your generous support to Crusade for Freedom in aiding these 70 million captives. If *you* don't send them the truth—who will?

Some ways business executives have helped. Check the ones you are interested in.

- ☐ Display Crusade material on your company bulletin board.
- ☐ Plan a paycheck stuffer to inform your employees of the importance of the Crusade for Freedom.
- ☐ Plan to conduct an in-company solicitation.
- ☐ Match employee funds with your *Truth Dollars.*

For campaign material and information write **CRUSADE FOR FREEDOM,** 345 East 46th St., N. Y. C. 17

Alcoa Aluminum Pipe resists the punishment of acid mine waters, above ground or below. Its light weight and ease of handling cut laying costs to the bone.

# Cut pipe laying costs over 77%

## with long-life ALCOA Aluminum Pipe...available in quantity for coal mine service

The figures at right compare actual surface laying time and costs for 3 miles of 2½" quick coupled aluminum pipe and the same length of 2½" steel pipe. If you're a strip mine operator, here is direct evidence that you can cut pipe laying costs by over 77% when you specify light weight yet strong and durable ALCOA® Aluminum Pipe for coal mining service. Underground installations are also economical, particularly in low seam coal. Happily, that's just part of the economy story.

The long service life and high reclaim value of ALCOA Aluminum Pipe bring still lower its actual cost-per-foot in service. The natural resistance of aluminum to corrosion by mine drainage waters often keeps it in service long after other types of pipe would fail. It is strong and durable, requiring only reasonable care in installation and operation.

ALCOA pioneered mine pipelines of aluminum over 10 years ago. That pioneering has proved that ALCOA Aluminum Pipe is the ideal solution to many coal mine pipeline problems . . . for lowest installation costs, operating-maintenance economies and long, satisfactory service. Get complete details today. Use the coupon, or write ALUMINUM COMPANY OF AMERICA, 924-C Alcoa Building, Pittsburgh 19, Pennsylvania.

**READY AVAILABILITY**—ALCOA Aluminum Pipe for mine service is available in quantity, in a wide range of diameters and wall thicknesses, from ALCOA distributor warehouses throughout the producing areas. Quick couplings of aluminum are available through the same supply houses. Check the Yellow Pages of your telephone directory for your nearest ALCOA sales office—to learn the supply source most convenient to your location.

Low laying cost is just part of Alcoa Aluminum Pipe's economy story. Schedule 40 aluminum pipe lasts two to ten times as long as ordinary pipe used to carry corrosive acid mine waters. Think of the money you'll save each time Alcoa Aluminum Pipe doubles your pipe life!

**Comparative Installation Time and Costs for 3 Miles of 2½" Pipe**

| | Quick Coupled | Aluminum—Schedule 5 | Steel—Schedule 40—Screwed |
|---|---|---|---|
| Crew Size | 3 | 5 | 5 |
| Man-hours | 27 | 35 | 120 |
| Man-hours Saved | 93 | 85 | |
| % Man-hours Aluminum vs. Steel | 22.50 | 29.00 | ... |
| Trucks Employed | 1 | 1 | 2 |

ALCOA ALUMINUM

Aluminum Company of America
924-C Alcoa Building, Pittsburgh 19, Pa.

Send me complete data on Alcoa Aluminum Pipe for coal mine service. My piping problem is _____

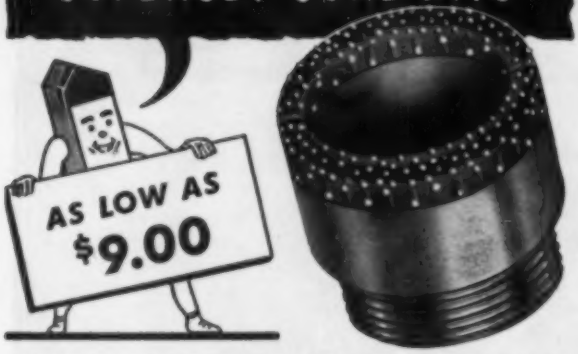
Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

# SUPERSET CORE BITS

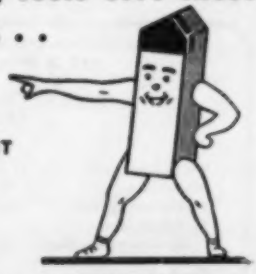


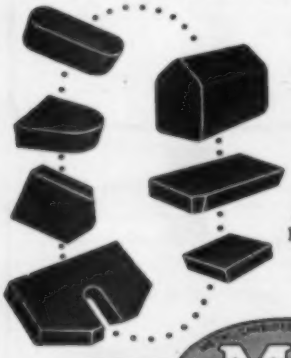

● Mining contractors, ore prospectors, coal operators and construction firms are realizing tremendous savings by taking advantage of our **exclusive fabrication service!** Contractors send us the necessary diamond stones from their own stocks—we hand set them in a super-hard tungsten carbide crown and braze to the threaded steel blank. Hand-set bits assure the proper positioning of each diamond stone to achieve maximum cutting efficiency. The carbide matrix holds the diamond stones until entirely used up. These advantages mean lower drilling costs to you. We can also supply complete core bits or salvage the stones from used bits at nominal cost. Supplied in standard sizes EX, EXE, AX, BX, NX, etc.

*Metal Carbides Corporation*
*Youngstown 7, Ohio*

## Talide Tips for Mining Tools Give These 3 BIG ADVANTAGES . . .

1. EXTRA STRONG
2. SUPER HARD
3. SHOCK RESISTANT





● A complete line of low-cost, high-quality Talide Tips is offered fabricators and users for tipping machine bits, rock bits, drill bits, roof bits and open-pit bits. All Talide Tips have a special surface finish that facilitates brazing. Non-standard shapes and sizes quoted on request.

TALIDE
YOUNGSTOWN 7, OHIO
SINTERED CARBIDES - HOT PRESSED CARBIDES
HEAVY METAL - CERMETS - HIGH TEMPERATURE ALLOYS
OVER 35 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

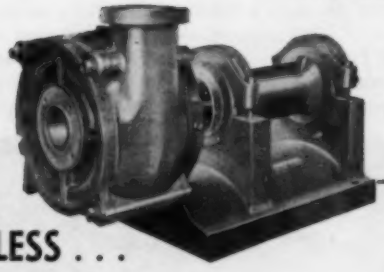
# New Parker HOZE-LOK fittings no skiving...easier to use!

- New re-usable *Hoze-lok* fittings for single- and double-wire braid rubber-covered hose are easy to make up. You don't have to strip off the hose cover . . . you can even assemble most sizes with only a hand wrench.
- Two simple steps: (1) dip end of hose in light grease, such as Parker *Threadlube*, and turn counterclockwise into socket; (2) dip nipple in *Threadlube* and screw into socket and hose.
- *Hoze-lok* holds beyond hose-bursting pressures . . . under severe vibration.
- Ask for NO-SKIVE *Hoze-lok* Catalog 4433.

Parker
Hydraulic and fluid system components

**Order from your Parker Distributor — or Tube & Hose Fittings Division, Section 427-E, The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio**

# LINATEX SAND PUMPS
## DEFY ABRASION . . . CORROSION



## LAST LONGER COST LESS . . .

It has been proven that:
Linatex Sand Pumps will outwear any other sand pumps in the world.
All wearing parts are covered with long lasting, abrasion resistant LINATEX.
If you are responsible for an efficient pumping operation at your plant, write for further information on the LINATEX Pump.
Made in 10 standard sizes from 1 to 12 inches.
NOTHING LASTS AS LONG AS LINATEX.

**Linatex Corporation of America**
Vernon Ave., Rockville, Conn.

# Pa. company switches to Du Pont NITRAMITE®— saves 10% on shooting cost alone

## SAVES ALSO ON HANDLING AND LOADING—AND WORK IS SAFER

**1. "Nitramite" blasting agent** goes into 60′ hole at one of Shawsville Mining Co.'s bituminous pits near Clearfield, Pa. "We started using 'Nitramite' nearly a year ago," says Genl. Supt. James Hudson, "and it's cut our explosives bill a full 10%." But this saving's only part of the story.

**2. "Nitramite" Primer** going into the hole. "Nitramite" cannot be accidentally exploded by rifle bullets, shock, friction or blasting caps. It should be detonated by insensitive "Nitramite" Primers which, in turn, must be initiated with Primacord. This gives you safer blasting.

**3. After loading and stemming** the hole, workman ties branch line of Primacord to trunk line. Sand-rock overburden ranges up to 40′—yet "Nitramite" breaks the rock even in the toughest formations, and handling's easier, loading safer because it cannot cause headaches.

**4. "Breakage is good** even when we're shooting 7-8 cu. yards per lb. of 'Nitramite,'" Mr. Hudson adds—and the shot proves his point. Thanks to this Du Pont "team," Shawsville Mining removes about 2,500 tons daily from seams once considered unprofitable—and costs are at rock bottom.

**Save when you buy,** when you handle, when you load —use Du Pont "Nitramite" blasting agent. It's a product you can load today and shoot tomorrow—and it adds a new dimension in safety. For complete details, contact our representative or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

**DU PONT**
**BLASTING AGENTS**
*Products of Du Pont Explosives Research*

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

# PROFESSIONAL SERVICES

**NEWELL G. ALFORD**
*Consulting Mining Engineer*
Coal Property Prospecting
Development, Operation and
Valuation
Oliver Building — Pittsburgh 22, Pa

**ALLEN & GARCIA COMPANY**
42 Years' Service to the
Coal and Salt Industries and Consultants
Construction Engineers and Managers
Authoritative Reports and Appraisals
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**AMERICAN AIR SURVEYS, INC.**
Registered Engineers
Topographic Maps for Mining
Aerial Photographs
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Phone EXpress 1-2969

**GEO. S. BATON & COMPANY**
"Founded 1900"
*Consulting Engineers*
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*Mining Engineers*
COAL OPERATION CONSULTANTS
VALUATIONS
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**THERON G. GEROW**
*Mining Consultant and Engineer*
111 North Wabash Avenue — Chicago 2, Illinois

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*Drill Contractors Since 1902*
Specialists in exploratory—grout hole and pressure grouting. Rigs located in over 50 strategic areas for prompt service. Free estimates.
104 Cedar St. — Punxsutawney, Penna.

**HURLEY & ZELLER**
*Mining Consultants*
Industrial Engineering Programs Established
Methods Analysis—Foremen Training—Cost Control
1824 Sunshine Ave, Johnstown, Pa. — 2809 Hart Street, Charleston, W. Va.

**KIRK & COWIN**
Ralph E. Kirk — Percy G. Cowin
*Registered Professional Engineers*
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Mechanical Mining of Ore & Coal
Management and Construction of Mines
1—18th St., SW—Birmingham, Ala.
Phone 56-5566

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Coal Preparation
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**J. W. WOOMER & ASSOCIATES**
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2—G.E. 825 Locomotives, 22" high, 4 ton.
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1—G.E. 8 ton, type 822 Locomotive, 44" Ga.
3—G.E. 10 ton, type 809 Locomotives, 42", 44" and 48", Ga.
1—G.E. 10 ton, 829 Locomotive, 36" Ga.
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1—Goodman 6 ton Locomotive, 26" high.
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2—Goodman, 8 ton, type 32A, 36" 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
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(W) 1—5SC Joy Shuttle Car—rebuilt
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(W) 2—32E10 Joy Shuttle Cars—rebuilt
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(C&W) 4—32D Jay Shuttle Cars
(C) 1—Lee Norse Shuttle Car
(W) 1—T2-5 Joy Cat Truck
(C&W) 6—12BU 9E Joy Loaders
(C) 1—8BU 500V. DC
(C) 1—8BU 250V. DC
(W) 1—8BU 250V. DC
(W) 1—8BU 11G, 220/440V. AC
(C) 1—29U Jeffrey, Rubber Mtd.
(C) 1—PLII-5E Joy Elevator
(C) 1—PLII-7E Joy Elevator
(C) 2PLII-8E Joy Elevators
(W) 4—40 H. P. Aamo self propelled air compressors—permissible

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(W) 1—MTB 28" Joy Belt Conveyor 870'
(W) 1—36" Belt Conveyor 2600'—almost new
(W) 2—MTB26" Joy Belt Conveyor 900' centers
(W) 2—95A 24' Goodman Conveyors, approx. 500'
(C) 1—MTB 28" Joy, 1000 centers, less belt
(W) 1—42" belt conveyor 250' long
(W) 1—30" belt conveyor
(W) 24" Belt Conveyor, 48' long complete with drive and 10 h.p. motor
(W) 1—26" x 90' belt conveyor
(W) 1—36" x 90' belt conveyor
(W) 1—28" x 20' belt conveyor
(W) 1—20" x 90' belt conveyor
(W) 1—22" x 40' Screaer Conveyor
(C) 1—26" Hewitt Robbins Belt, 1200' long
(C) 1—600' Rotary Dump & Button Conveyor
(C) 1—Mixing Belt Conveyor
(C&W) 8—61AM Jeffrey Room Chain Conveyors
(W) 10—61HG Jeffrey Face Chain Conveyors
(W) 3—61EW Jeffrey Elevating Chain Conv.
(C&W) 6—61W Jeffrey 15" Chain Conveyor
(W) 4—5" Jay Chain Conv., permissible
(C) 2—20" Jay Chain Conveyors
(W) 6—G15 Goodman Shaker Conveyors
(C&W) 12—G12½ Goodman Shakers AC & DC
(W) 8—G12½ Goodman Shakers 220/440 V. AC
(W) 1—PT12 Long Piggyback Conveyors
(W) 1—PT15 Long Piggyback Conveyors
(W) 33—Goodman Power Duckbills, Mod. 477 G11½
(W) 1—24" x 48' tipple belt conveyor
(W) 12—61AM Jeffrey head and tail pieces
(W) 26—G20 Shaker Drives

**CUTTING MACHINES**

(W) 4—7B Sullivans
(C&W) 4—7AU Track mtd. Sullivans
(W) 8—11B Sullivans, both 35 & 50 h.p.
(W) 1—29C Jeffrey Arc wall
(C) 1—29U Jeffrey 220/440 V. 42" t.g. Excellent
(C) 1—35L Jeffrey
(C&W) 15—35B & 35BB Jeffreys, as is or rebuilt
(C&W) 6—12AB Standard Goodmans 35 h.p.
(W) 4—12AA Standard Goodmans, 50 h.p.
(W) 3—212AA Baby Goodmans
(W) 1—312 G3, 220/440V. AC Goodman, rebuilt
(W) 2—412 GA Goodmans
(W) 6—512 DA Goodmans
(C) 2—712 Goodmans
(C) 1—824 Goodmans, 42" t.g.
(C) 1—1224 Goodman, rubber m'd.
(C) 1—Lot machine truck for Jeffrey & Goodman

**LOCOMOTIVES**

(W) 1—4 Ton Ironton, 42" t.g. battery
(W) 1—4 Ton Ironton, 42" t.g. completely rebuilt, 23" high
(C) 1—MH12 Jeffrey
(C) 2—MH96 Jeffreys
(W) 3—MH88 Jeffreys
(W) 1—MH150 Jeffrey, 42" t.g., 25" high
(C) 1—MH110 Jeffrey, 42" t.g.
(C&W) 4—MH100 Jeffreys, 36" t.g.
(W) 5—HM803 GE 36", 42" or 44" t.g.
(W) 5—HM823 GE 42" t.g.
(W) 1—6-30 Goodman, 4 ton, 25" high, 36" t.g.
(C&W) 2—904 West, 6 ton locomotive
(C&W) 1—6 ton, G.E. Battery, batteries, all new
(C) 1—10 Ton West. Locomotive, 48" t.g.
(C) 1—8 Ton GE
(W) 2—4 Ton Goodman
(C&W) 3—3314T, Goodmans, 6 ton
(W) 1—8 Ton Goodman

**MINE CARS**

(W) 200—42" t.g., 25" high, end dump
(W) 15—42" t.g. 19" high, end dump
(W) 50—36" t.g. ACF drop bottoms, cheap
(W) 13—36" t.g. Sanford Day drop bottoms
(C) 14—42" t.g. End dump, wood
(W) 30—44" t.g. end dump, 3 ton, a'l steel, excel.
(W) 75—44" t.g. End dump, 2½ Ton, composite cars, Enterprise
(W) 85—44" t.g. End dump, 2 ton, Enterprise composite
(W) 100—44" t.g. End dump, 1½ ton, 23" high composite
(C) 150—Rotary dump, 48" t.g., 30" high

**SUBSTATIONS**

(C) 1—100KW, GE motor generator set
(W) 1—200 KW West. Rotary, 1200 RPM, 2300/4000V. AC, 275 DC auto. breakers
(C) 1—200KW SCCS, GE Rotary, 2300/4000V, 275 DC
(C) 1—150 KW West. MG set 2000V.
(W) 1—150 KW West. MG Set, 1200RPM, 2200V. 275 DC
(W) 1—150 KW Rotary 2300/4000, automatic
(W) 150 KW GE MG set, 1200RPM, 2200V. 275 DC
(W) 1—150 KW Crocker Wheeler MG set 2200V.
(W) 1—30KW Portable Generator

**MISCELLANEOUS**

(W) 5000'-30" Goodyear Coal Flow & Raybestos Manhattan Homecord Belt
(W) 1—75 h.p. 220/440 Dust-proof motor
(C&W) 2—60 h.p. Slope hoists
(C&W) 2—Sullivan Car Spotting Hoists
(C&W) 8—HKL Brown Fayre car spotting hoists
(C) 1—Nolan Automatic Car Spotter
(C&W) 12—Hoists, 5 to 100 h.p.
(C) 1—HKM Brown Fayre Car Spotting Hoist
(C) 1—25 h.p. Double Drum Hoist
(C) 1—15 H.P. Car Spotting Hoist, 220/440 V.
(W) 2—Sets Mine track scales
(W) 2—Crossover dumps—new and used
(C&W) 16—Coal Drills, A7, 56A, 471 and 572, AC & DC
(W) 1—Armco Prefab steel building—130' long
(W) 1—5' Morrow Shaker
(C) 42" Loading boom, 32' long
(C) 1—48" loading boom

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*(C) Denotes equipment located at Clarksburg, W. Va.

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**...from pit**

**...on haul**

**...to tipple**

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Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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WILL DEMONSTRATE**

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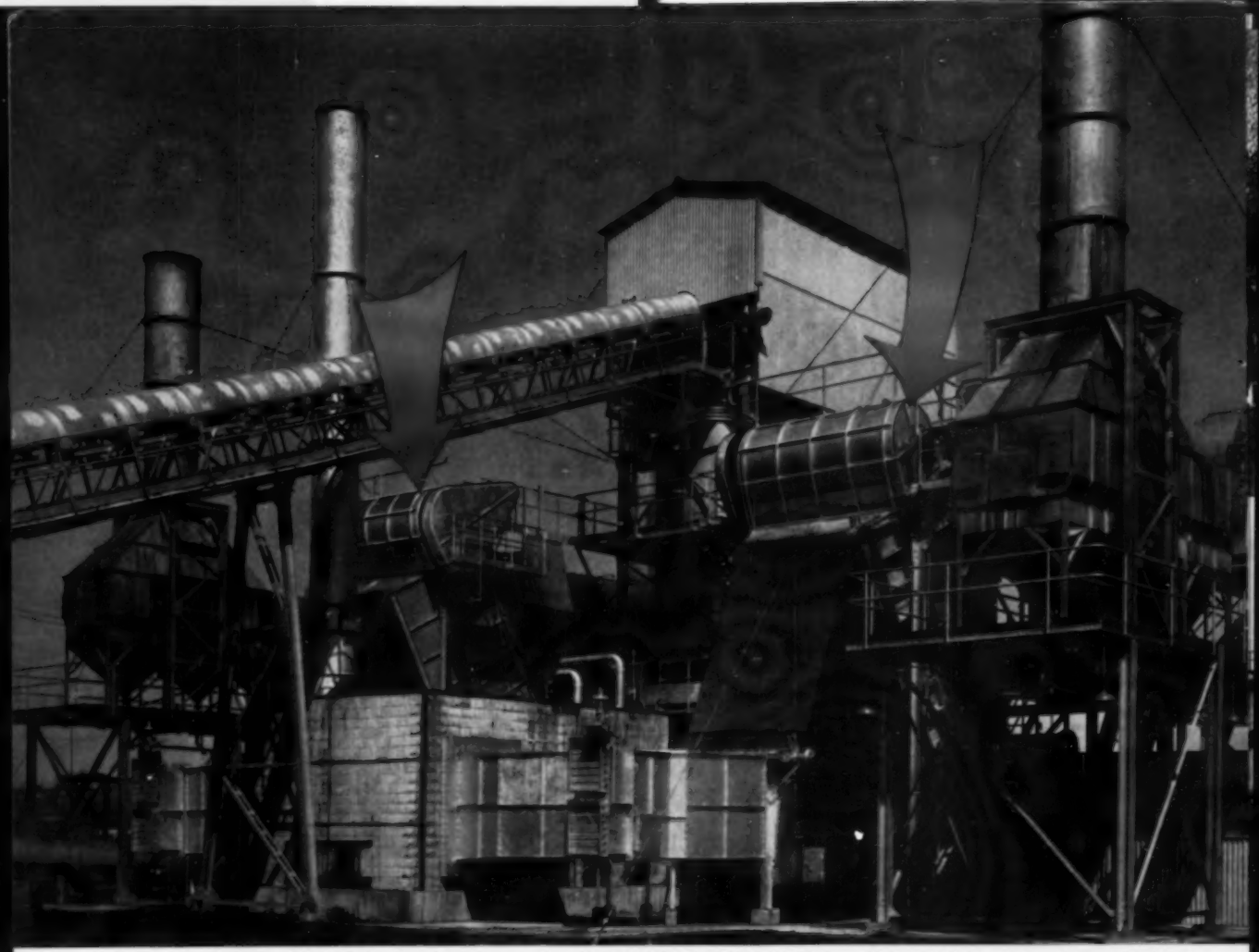

View of large metallurgical coal cleaning plant shows two of three Link-Belt Multi-Louvre Dryers which provide low-cost moisture reduction.

**How LINK-BELT Multi-Louvre dries coal uniformly, gently with**

# LOWER TEMPERATURE AND LESS HORSEPOWER

TODAY, more and more coal operators are switching to the Link-Belt Multi-Louvre dryer. The reason: they get a more marketable coal at lower cost per ton. Here's why:

### LESS DUST AND DEGRADATION

Gentle action, plus accurate, automatic control, maintains size of your product whether it's 1½ inch or minus 28-mesh.

### LOWER POWER REQUIREMENTS

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### NO OXIDATION

Product temperatures of 100° to 120°F prevent oxidation of coal. This is particularly important when drying metallurgical coal.

### GREATER SAFETY

Explosion hazards are minimized. Multi-Louvre's low air velocities reduce dust in the air stream.

For other reasons why Multi-Louvre Dryers are first choice among experienced operators, see the coal preparation specialist in the Link-Belt office in your field. Or write for a copy of Book 2609.

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